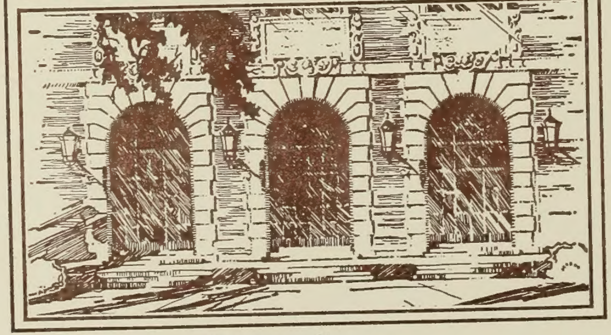
LIBRARY OF THE
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

616.99405
CAR
v.7



~~VETERINARY MEDICINE~~

LIBRARY U. OF I. URBANA-CHAMPAIGN

LIBRARY U. OF I. URBANA-CHAMPAIGN

CARCINOGENESIS ABSTRACTS

Volume 7 1969

CONTENTS

	Page
Review	1, 43, 92, 144, 191, 241, 287, 333, 385, 427, 469, 509
Physical Carcinogenesis	3, 47, 97, 146, 194, 247, 289, 337, 387, 430, 472, 513
Chemical Carcinogenesis	6, 49, 101, 148, 199, 251, 293, 340, 390, 433, 475, 516
Viral Carcinogenesis	22, 70, 115, 165, 210, 265, 308, 352, 400, 447, 486, 526
Epidemiology and Biometry	29, 77, 126, 180, 225, 272, 327, 370, 409, 460, 494, 537
Miscellaneous	35, 86, 139, 185, 236, 282, 331, 381, 422, 463, 505, 546
Author Index	551
Subject Index	577

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

616.99405
CAR

~~Vet. Med~~

~~VETERINARY MEDICINE~~
LIBRARY

JANUARY 1969
Abstract Nos. 1-216

Vol. 7
No. 1

UNIVERSITY OF ILLINOIS
OCT 27 1969
LIBRARY

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

NOTICE

October 1968

To Recipients of CARCINOGENESIS ABSTRACTS:

Publication of this abstract journal is being resumed with this issue (Volume 7, No. 1). At a later date the National Cancer Institute will attempt to provide coverage of the carcinogenesis literature between the time this abstract journal was last published (August 1965; Vol 3, No. 8) and the present.

This journal is provided at no cost to appropriate libraries, to National Cancer Institute contractors, grantees and researchers, and to other investigators who are engaged in studies related to experimental or clinical aspects of cancer induction. Eligible individuals and organizations who are not on the mailing list and who wish to receive this journal should send to the Project Officer a letter stating the nature of their investigative work along with a complete mailing address, including zip code. All others may purchase the journal from the Government Printing Office.

M. S. Fish, Ph. D.
Project Officer
CARCINOGENESIS ABSTRACTS
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

616.99405
CAR
v.7

CARCINOGENESIS ABSTRACTS

Volume 7, Number 1
January, 1969

(Submitted for Publication
October, 1968)

Abstract Numbers
1-216

CONTENTS

	Page
Review	1
Physical Carcinogenesis	3
Chemical Carcinogenesis	6
Viral Carcinogenesis	22
Epidemiology and Biometry	29
Miscellaneous	35
Author Index	i
Subject Index	iv

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Pursuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a national program of cooperative research in cancer, is establishing a means whereby information in the field of carcinogenesis will be coordinated and made available. The information to be included will be obtained from the National Cancer Institute, other governmental agencies, and non-governmental research institutions.

The issuing of *Carcinogenesis Abstracts* under the auspices of the National Cancer Institute will provide a central source for current abstracting of the carcinogenesis literature being published throughout the world. This will help facilitate an integrated and cooperative program of investigation in this area. The growing number of publications in the area of carcinogenesis makes imperative the availability of an appropriate abstracting service so that investigators may be apprised of progress with a minimum of delay. It is our desire to provide the investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most recently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. If the journal is not covered by *Index Medicus*, then the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

admin.	administered, administration	mg	milligram(s)
av.	average	min.	minute(s)
C	curie(s)	ml	milliliter(s)
mC	millicurie(s)	mm	millimeter(s)
µC	microcurie(s)	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
conc.	concentration	NIH	National Institutes of Health, USA
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	QO_2	oxygen quotient
DNase	deoxyribonuclease	PFU	plaque forming unit
e.g.	for example	ppm	parts per million
FFU	focus forming unit	pt.(s)	patient(s)
g.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
g	gram(s)	RES	reticuloendothelial system
µg	microgram(s)	resp.	respectively
Hb	hemoglobin	RNA	ribonucleic acid
i.a.	intra-arterial	RNase	ribonuclease
ID_{50}	median infectious dose	soln.	solution
inj.	injected, injection(s)	s.c.	subcutaneous
inoc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
i.p.	intraperitoneal	x	times (e.g. x 3/wk.)
I.U.	international unit(s)	U	unit
i.v.	intravenous	UV	ultraviolet
kg	kilogram(s)	vol.	volume
LD_{50}	median lethal dose	VA	Veterans Administration
M	molar, mole(s)	wt.	weight
mM	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
µM	micromole(s)		
max.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

Af.	Afrikaans	E.	English	Hun.	Hungarian	Lith.	Lithuanian	Ser.	Serbo-Croatian
Ar.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
Bul.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
Ch.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
Cz.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
Dan.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
Dut.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

69-1 Tobacco: Experimental and Clinical Studies. A Comprehensive Account of the World Literature. Supplement I. (E.) Larson, P. S. (Med. Coll. Virginia, Richmond) and H. Silvette. Baltimore, Williams & Wilkins, 1968; 803 pp. $20.00.

Chapter 18 of this book (pp. 346-380) deals with tobacco smoking and disease in general, including morbidity and mortality statistics. Chapter 21 (pp. 476-674) deals with tobacco smoking and malignant diseases; the longest section (pp. 499-674) is a discussion of lung cancer. Most of the references are dated 1959-1966. (About 4050 references)

69-2 EPIDEMIOLOGICAL CONCEPTS RELATIVE TO CANCER OF THE ORAL CAVITY. (E.) Rowe, N. H. (Washington U. Sch. Dentistry, St. Louis, Mo.). Missouri Med. 65(8):660-664, 668, 679, 1968.

Extrinsic factors (sunlight, tobacco or betel chewing, pipe or cigar smoking, alcohol, chronic irritation) and intrinsic factors (Plummer-Vinson syndrome, vitamin A deficiency, possibly cold climate) in the development of oral cancer are reviewed. (54 references)

69-3 NICOTINE REDUCTION IN TOBACCO AND TOBACCO SMOKE. (E.) Stedman, R. L. Pp. 113-119 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Genetic selection, fermentation, selective filtration with acidification, tobacco additives (sodium ntirate, ethylene oxide) and other methods for nicotine reduction are discussed. (27 references)

69-4 MECHANICAL FILTRATION: A REVIEW OF FILTRATION MECHANISMS PERTINENT TO CIGARETTE SMOKE. (E.) Mitchell, R. I. and J. A. Gieseke. Pp. 121-132 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Analysis of the equations relative to cigarette smoke filtration led to the conclusion that since smoke passes through the filter at low velocity, the controlling mechanism in the removal of tar particles (up to 50% with modern commercial filters) is interception. The collection efficiency increases with decreasing fiber diameter, but filtration efficiency is essentially independent of particle size. (24 references)

69-5 CANCER OF THE BREAST--A DARWINIAN DISEASE. (E.) Bogardus, G. M. Amer. Surg. 34(7):528-529, 1968.

Possible reasons for the observed correlation between thyroid hypofunction and a high incidence and virulence of breast cancer are discussed briefly. (8 references)

69-6 DOSE RESPONSE: EXPERIMENTAL CARCINOGENESIS. (E.) Bock, F. G. Pp. 57-63 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann. (Eds.) Washington, D. C., U. S. Government Printing Office, 1968, 282 pp. $3.75.

In a review of the literature it is stressed that carcinogenesis by cigarette smoke condensate in mouse skin resembled that seen with pure carcinogens (benzpyrene, dimethylbenzanthracene), with a threshold at very high doses and a linear dose-response relationship at lower doses. (12 references)

69-7 RELATIVE ROLE OF AEROSOL AND VOLATILE CONSTITUENTS OF CIGARETTE SMOKE AS AGENTS TOXIC TO THE RESPIRATORY TRACT. (E.) Rylander, R. Pp. 221-229 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Following a discussion of the somewhat contradictory reports in the literature, it is tentatively suggested that the volatile constituents of cigarette smoke (toluene, acetone, acetonitrile, isoprene, acetaldehyde) are of less significant toxicity than the aerosol components (nicotine, tar, phenol), because of selective absorption in the human mouth (61-76% of the water-soluble components and 22-33% of the insoluble components are absorbed from the mouth) and the large dilution of smoke found in man (the ratio of undiluted smoke to tidal vol. in 1 study was 0.04). (29 references)

69-8 NITROSAMINES IN TOBACCO SMOKE. (E.) Johnson, D. E., J. D. Millar and J. W. Rhoades. Pp. 181-189 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Methods of smoke collection and nitrosamine analysis are reviewed. Since the formation of nitrosamines requires equimolar mixtures of NO and NO_2, and since little or no NO_2 is present in cigarette smoke, it is suggested that the conc. of nitrosamines produced under normal conditions of cigarette smoking is very low (not over 0.01 µg/cigarette in the absence of nitrate treatment). A bioassay method, involving preparation of nitrosamine on small particles and depositing the particles on the skin or directly into the lung of an animal, is suggested. (13 references)

69-9 ROLE OF RADIOACTIVE SUBSTANCES IN EFFECTS OF SMOKING. (E.) Casarett, L. J. Pp. 199-209 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C. U. S. Government Printing Office, 1968, 282 pp. $3.75.

The role of ^{210}Po is discussed. This α-emitter causes cardiovascular changes (arteriosclerosis, arteriolar nephrosclerosis) and probably induces or promotes tumor formation. Inhalation of colloidal ^{210}Po (median particle diameter about 0.05 μ) resulted in accumulation of about 50% of the label in the upper respiratory tract in dogs and rats, with a biological half-life in these tissues of about 6-12 hr., compared to 20 days in the lung parenchyma. After inhalation or i.v. admin., ^{210}Po behaves as a colloid; accumulation of ^{210}Po in the lungs, bronchi, liver, kidneys and hair follicles in dogs, rats or rabbits is illustrated. (30 references)

69-10 GENESIS OF CANCER (A TEMPORAL APPROACH). (E.) Kothari, M. L. (Seth G. S. Med. Coll., Bombay). J. Postgrad. Med. 14(2):49-69, 1968.

The concept of "fixed cell division capacity" and its temporal and genetic relationship to the capacity of stem cells (alpha cells) to divide into differentiated daughter cells (n cells) and/or more stem cells is discussed. It is suggested that when the fixed cell division capacity is exhausted, the usual differentiation of the stem cell into 1 stem cell + 1 daughter cell stops, to be replaced by division into stem cells only (defined as a neoplasm). (83 references)

69-11 A POSSIBLE DEFINITION OF THE CANCER PROBLEM. (E.) Altman, R. F. A. Hospital (Rio) 73(5):1525-1564, 1968.

The relationship between phospholipids (P) and cholesterol (C) and the induction, growth and inhibition of cancer (excluding the leukemias) is discussed. It is concluded that non-viral carcinogens act directly on the cell membrane and that membrane permeability is enhanced by P and other surface-active compounds and inhibited by C and related compounds (including polycyclic hydrocarbons and some of the steroid hormones); therefore, that a high P:C ratio decreases the probability of tumor formation. (482 references)

69-12 ORAL CARCINOMA: A REVIEW OF THE ETIOLOGICAL FACTORS AND A PREVENTIVE PROGRAMME. (E.) Omar-Ahmad, U. (Inst. Med. Res., Kuala Lumpur, Malaysia), K. Ramanathan. Med. J. Malaya 22(3):172-181, 1968.

The roles of tobacco use, oral irritation, alcohol consumption, syphilis, nutritional deficiency (particularly vitamin deficiency), premalignant lesions (leukoplakia, oral melanosis, oral submucous fibrosis), chronic ulceration and radiation damage in the etiology of oral cancer in Southeast Asia are discussed. (50 references)

69-13 PROGRESSION OF MALIGNANCY: A HYPOTHESIS. (Ger.) Goldenberg, D. M. (U. Erlangen-Nuremberg, Germany). Klin. Wschr. 46(16):898-899, 1968.

Previously published immunological and karyological data on the antigenic characterization of a heterotransplanted human ovarian tumor (WG-127) demonstrated hybridization with normal hamster cells, resulting in an increase in malignancy of the original tumor cells and causing invasive growth and metastases in the hamster host. It was therefore suggested that the progression of tumors to invasiveness and metastases could result from mating of normal somatic and tumor cells, to form a population of cells with a selective advantage over other components of the heterogenous tumor cell population. This could also explain the occasionally observed different responsiveness of primary and secondary tumor cells to therapy, since metastases would contain more of these mated cells. The possibility that the mating of normal somatic cells could be the primary impulse for neoplastic transformation under some conditions is also considered. (40 references)

69-14 OCCUPATIONAL AND ENVIRONMENTAL DANGER OF ASBESTOS. (Ger.) Bohlig, H. (City Hosp. Lüdenscheid, Germany). Deutsch Med. Wschr. 32(9):1529-1531, 1968.

The danger from asbestos dust inhalation exists in the environment of almost all major industrial cities, because of its extensive use in many different industries. In spite of the precautions taken lately in the asbestos industry itself, the frequency of lung cancer and diffuse malignant mesothelioma of the pleura and peritoneum has increased in Germany and other industrial nations since 1955, not only in people directly exposed to asbestos occupationally, but also in persons exposed to it only occasionally and not occupationally. In these "endemic" cases of mesothelioma, at least 10-15 yr. (av. 20-30 yr.) elapses between exposure and the appearance of the first clinical symptoms. In many major cities (unspecified), asbestos was discovered on autopsy in the lungs of 25% of adult inhabitants. There also seems to be an increase of cases with pleural changes, the markedly hyaline "pleural plaques" which start with a thickening of the pleura parietalis and are often mistaken for pulmonary foci. "Plaque cases" detected during X-ray examination should be regarded as an indicator of air pollution with asbestos and warning of the possible danger of developing mesothelioma. (9 references)

69-15 BRAIN TUMORS AND INJURIES. (E.) Deisenhammer, E. (City Hosp., Linz, Austria), O. Schnopfhagen and G. Weiser. Wien. Med. Wschr. 118(25/26): 565-566, 1968.

Four adults with brain tumors and cerebral injuries are described. One pt., with a history of electroshock therapy for schizophrenia (of undetermined duration), responded to electroshock therapy and neuroleptics for nearly 2 yr., then was readmitted in relapse 4 wk. after sustaining a head injury. The pt. died suddenly 5 days later; autopsy showed an occipital glioblastoma multiforme. The other 3 pts. were in normal health until they sustained brain injuries, followed by signs of traumatic psychosis. One pt. died about 1 mo. after the injury; autopsy showed a frontal glioma. In 1 pt., neuropsychiatric symptoms developed 1 mo. after the injury and brain surgery showed a glioblastoma multiforme. The other pt. recovered from the post-traumatic symptoms for 5 mo., then died suddenly; autopsy disclosed a parieto-occipital meningioma. The relationship, if any, between the injuries and the tumors could not be established.

69-16 DIFFERENCES IN SURVIVAL VARIATIONS DURING THE GROWTH CYCLE OF CULTURED CHINESE HAMSTER CELLS TREATED WITH SULFUR MUSTARD AND X-RAYS. (E.) Mauro, F. (NCI, Bethesda, Md.) and M. M. Elkind. Cancer Res. 28(6):1150-1155, 1968.

In asynchronized V79-753B or V79-661 hamster cells or in cells synchronized by selective trypsinization or hydroxyurea, the max. survival rates after X-ray treatment were seen in cells treated during the S phase (latter half of DNA synthesis); in cells treated with sulfur mustard (0.25 μg/ml), max. resistance was seen in cells treated during the G2 (post-DNA synthetic) phase. Either treatment therefore rendered asynchronous cells partially synchronized although out of phase.

69-17 COMPARISON OF REPAIR OF SUBLETHAL DAMAGE IN CULTURED CHINESE HAMSTER CELLS EXPOSED TO SULFUR MUSTARD AND X-RAYS. (E.) Mauro F. (NCI, Bethesda, Md.) and M. M. Elkind. Cancer Res. 28(6):1156-1161, 1968.

In V79-1 hamster cells exposed to graded doses of sulfur mustard (SM; 0.03-0.24 μg/ml), survival curves were sigmoid, beginning with a shoulder and becoming exponential above 0.06 μg/ml; this suggested accumulation of damage for a lethal effect of SM, which in turn implied sublethal damage to the surviving cells in the initial stages. The cells surviving sublethal doses of SM (0.09 + 0.03 μg/ml in 2 doses) or X-rays repaired sublethal damage rapidly as the growth cycles progressed; this was noted in both asynchronous and hydroxyurea-synchronized cells. Repair of damage induced by sublethal levels of SM was seen at temperatures where little cell progression was noted.

69-18 MYCOSIS FUNGOIDES FOLLOWING APPLICATION OF THOROTRAST WITH DEVELOPMENT OF RETICULUM CELL SARCOMATOSIS. (Ger.) Hundeiker, M. (U. Clin. Freiburg i. Br., Germany), H. Berger and J. Petres. Arch. Klin. Exp. Derm. 232(1):56-65, 1968.

A 23-yr.-old man underwent carotid angiography using Thorotrast (^{232}Th) for diagnostic reasons (skull fracture). The first skin changes appeared 12 yr. later and were identified as mycosis fungoides. The pt. responded at first to ACTH and corticosteroids, but about 11 yr. after onset the pt. developed skin and lymph node tumors. The diagnosis of reticulum cell sarcoma was made about 7 yr. later, about 2 mo. before the pt. died (30 yr. after the application of Thorotrast). Autopsy showed both mycosis fungoides and polymorphocellular reticulum cell sarcoma and typical Thorotrastosis (especially in the liver and spleen). Although mycosis fungoides had not developed in precisely the same areas where the isotope was deposited, Thorotrast was believed to have induced both tumors.

69-19 MALIGNANT TUMORS AS A LATE COMPLICATION OF VACCINATION. (E.) Reed, W. B. (Burbank, Calif.) and E. Wilson-Jones. Arch Derm. (Chicago) 98(2):132-135, 1968.

Two women and 4 men (29-80 yr.) who developed basal cell carcinoma (4), squamous cell carcinoma (1) or malignant melanoma (1) in vaccination scars are reported. The tumors developed 6 mo. (in the pt. with melanoma) to up to 60 yr. after vaccination. Previously basal cell carcinomas had been removed from 3/4 pts. with basal cell carcinoma; since 4/4 showed evidence of sun damage to exposed areas of the skin (at least 3/4 had fair, freckled skin) and lived in Southern California, sun exposure was suggested as the main etiologic factor. The pt. with squamous cell carcinoma was very prone to skin cancer because of xeroderma pigmentosum and had previously undergone many excisions of squamous cell and basal cell carcinomas and keratoacanthomas; vaccination was probably only a minor factor in the development of the tumor at this site. Because of the short time interval between vaccination and the appearance of malignant melanoma in the scar of 1 pt., the possibility of a virus-induced mutation of melanocytes at the vaccination site was raised.

69-20 LEUKEMIA IN PATIENTS WITH CANCER OF THE CERVIX UTERI TREATED WITH RADIATION. A

REPORT COVERING THE FIRST 5 YEARS OF AN INTERNATIONAL SURVEY. (E.) Hutchison, G. B. (Harvard Sch. Public Health, Boston, Mass.). *J. Nat. Cancer Inst.* 40(5):951-982, 1968.

Follow-up data of 30,244 unselected pts. with cervical cancer treated by 31 clinics in 9 countries (West Germany, England, Italy, Puerto Rico, U.S., Austria, Italy, Greece, Czechoslovakia) in 1960-1966 were studied. The minimum follow-up time was 1 mo. Of the 29,493 evaluable pts., 24% were enrolled in the study before completion of the first course of radiotherapy (RT), 50% were enrolled within 1 yr. after the end of RT, 25% had survived 5 yr. or more and 3% had survived at least 15 yr. The control group was the 9% of the group (2407 pts.) who received no RT. All pts. showing signs of blood diseases at the time of enrollment were excluded from the group. In the evaluable group, an accumulated total of 60,000 pt.-yr. was assembled. Four cases of leukemia (2 myeloid, 2 lymphatic) and 5 of lymphoma (2 lymphosarcoma, 3 reticulum cell sarcoma) were seen in RT-exposed pts. who showed at least 1 completely normal WBC before diagnosis of the hematologic disease. The incidence and type of leukemia was not significantly different from the expected incidence in the general female population at these ages (46-67 yr.). In the pts. not admin. RT, with an accumulated total of 6000 pt.-yr., there was 1 case of leukemia (lymphatic type). One untreated and 25 treated pts. developed non-malignant bone marrow diseases, 9/26 following chemotherapy. Leukemia incidences for the total group and for various subgroups (classified by duration of follow-up and the type of RT admin.) were compatible with general population rates. A 3-fold increased risk could be excluded in all pts. admin. external RT + intracavitary radium. For pts. at risk 4-8 yr. after RT, a 4-fold increased risk was possible but a 5-fold risk could be excluded.

69-21 Po^{210} AND Pb^{210} IN TOBACCO. (E.) Tso, T. C. P. 211 in *Toward a Less Harmful Cigarette. NCI Monograph 28*, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U.S. Government Printing Office, 1968, 282 pp. $3.75.

The ^{210}Po conc. in various American tobaccos was 0.15-1.01 μμc (pc)/g. Natural ^{226}Ra levels in tobacco soils were 0.52-1.53 pc/g, usually higher in continuously cultivated and phosphate-fertilized soils. Experiments with tobacco plants grown in a ^{222}Rn atmosphere showed that airborne ^{222}Rn and its daughters are not a major source of ^{210}Pb or ^{210}Po. Root absorption accounted for most of the label distribution; ^{210}Pb applied to growing leaves remained in the leaves.

69-22 HIGH RADIUM-226 CONCENTRATIONS IN PUBLIC WATER SUPPLIES. (E.) Hickey, J. L. S. and S. D. Campbell. *Pub. Health Repts.* 83(7):551-557, 1968.

The radium contents of 891 samples from public water sources supplying 3,864,500 persons in 20 states were analyzed in May-June, 1966. All samples were ground water and had not been processed by aeration, flocculation, settling and/or softening; most samples were taken from water supplies provided for 3000 or more persons. Radium levels of 3.0 μμc (pC)/liter or over were seen in 41/891 samples, supplying 144,370 persons (as of 1966) in Minnesota (13/64; most from the south and southeast, especially near the Mississippi), South Dakota (5/42), Texas (5/97; usually the central area), Oklahoma (3/67), Missouri (5/67; eastern area), Colorado (4/43; southeastern area), Kansas (2/92), Nebraska (2/79), Hawaii (1/17; Wahiawa, island of Oahu) and Louisiana (1/44). Four samples, supplying a total population of about 3000 persons, contained 10.29-24.11 pC/liter (Montrose and Howard Lake, Minnesota; Wiley, Colorado; and Afton, Oklahoma, in decreasing order). Radium levels were below 3 pC/liter in all samples from Alaska (5), Arizona (41), Arkansas (42), Maine (25), Michigan (8), New Hampshire (19), New Mexico (30), North Dakota (33), Utah (58) and Wyoming (18).

69-23 RADIOACTIVE JEWELRY AS CAUSE OF CUTANEOUS TUMOR. (E.) Gerwig, T. and M. N. Winer. *J.A.M.A.* 205(8):595-596, 1968.

A 50-yr.-old man, who underwent amputation of the left ring finger for infiltrating squamous cell carcinoma of the skin, had worn 3 different rings over 30 yr. One ring had been rebuilt after 21 yr. of wear; the pt. later transferred it to his right ring finger because of pruritus and discomfort, but stopped wearing it about 8 yr. later because of a similar skin reaction on that finger. Biopsy of this finger showed mild radiation dermatitis. This ring showed a high level of β-emission (about 0.7 rads/hr.), confined to a gold insert; another ring belonging to the pt., reconstructed by the same jeweler, showed a level of radioactivity (0.002 rads/hr.). The radioactivity was traced to radon seeds incorporated into the gold by the industrial processor. Another pt. with Bowen's disease of 1 ring finger, whose ring was highly radioactive (about 0.9 rads/hr.), is also mentioned. The authors recommend closer surveillance of industrial gold processing, and investigation of the possibility of radiodermatitis in pts. developing dermatitis of the ring fingers.

69-24 OPHTHALMOLOGIC ASPECTS OF CARCINOMA OF THE SPHENOID SINUS INDUCED BY RADIUM POISONING. (E.) Hasterlik, R. J., L. J. Lawson, Jr. and A. J. Finkel. *Amer. J. Ophthal.* 66(1): 55-58, 1968.

A 66-yr.-old woman with occipital pain of about 1 yr. duration (previously identified and treated as cervical spondylitis) suddenly developed unilateral oculomotor paralysis. Skeletal X-ray examination showed spinal osteoarthritis, widespread osteolysis (particularly in the skull) and a lesion of the right sphenoid sinus, identified at surgery as undifferentiated carcinoma of the sinus epithelium. The pt. had been treated with i.v. and p.o. radium salts 37 yr. previously for infertility and other conditions; spectrometric examination showed 1.29 μc of residual ^{226}Ra. The pt. was treated with ^{60}Co irradiation (6000 r) and showed marked improvement lasting 33 mo. at the time of report.

69-25 CYTOGENETICS OF THE IN-UTERO EXPOSED OF HIROSHIMA AND NAGASAKI. (E.) Bloom, A. D. (U. Michigan Sch. Med., Ann Arbor), S. Neriishi and P. G. Archer. Lancet 2(7558):10-12, 1968.

Complex chromosomal rearrangements were seen in cultured peripheral WBC from 15/38 (39%) selected subjects whose mothers had been exposed during pregnancy (the first 3 mo. in 3/15) to an estimated 104-477 rads of atomic irradiation. The frequency of chromosomal rearrangement in all cells examined was 0.52%, compared to 0.04% among 48 unselected controls (2/48 or 4% showed aberrations) and 0.19% among 20 subjects exposed *in utero* to 24-85 rads (3/20 or 15% showed aberrations). None of the individual preparations (each about 100 cells) showed chromosomal aberrations in more than 3 cells. The proportion of abnormal cells increased with radiation dosage (0.37% at 100-150 rads, 0.77% at over 300 rads), although this increase was not significant. The most frequent aberrations noted in all groups were single chromatid and isochromatid gaps or breaks, followed by fragmentation and translocation; other aberrations, seen only with the higher doses, included deletions, centromere breaks, dicentrics and rings. It is concluded that *in utero* radiation exposure affected both the lymphocyte precursors and mature, immunologically competent lymphocytes.

69-26 COMPARISON OF SURVIVAL KINETICS AND MODIFICATIONS OF LETHAL DAMAGE IN CULTURED CHINESE HAMSTER CELLS EXPOSED TO SULFUR MUSTARD AND X-RAYS. (E.) Mauro, F. (NCI, Bethesda, Md.), M. M. Elkind and K. Sakamoto. Cancer Res. 28(6):1143-1149, 1968.

69-27 BURN SCAR CARCINOMA. (E.) Castillo, J. (Mem. Sloan-Kettering Cancer Ctr., New York, N. Y.) and H. S. Goldsmith. CA 18(3): 140-142, 1968.

See also abstract nos.: 9,136,160

69-28 INHIBITORY EFFECT OF DEHYDROACETIC ACID ON INDUCTION OF HEPATOMA IN RATS FED 4-(DIMETHYLAMINO) AZOBENZENE. (E.) Miyaki, K. (Chiba U., Japan), M. Akao, Y. Kagaya and S. Kanisawa. Gann 59(2):85-96, 1968.

In male Wistar rats fed 0.06% dimethylaminoazobenzene (DAB; for 126 d), or with DAB (same regimen) followed by 0.25% dehydroacetic acid (DHA; for 162 d), the incidence of hepatoma and cholangiocarcinoma was 6/22 (27.3%) and 9/21 (42.9%), resp. In rats admin. DAB + DHA (for 173 d), there were no malignant tumors, although premalignant changes (atypia and adenomatous nodules) developed in 10/16 (compared to 16/22 and 10/21 with atypia in the first 2 groups). Hepatic fibrosis developed in 3/16 admin. DAB + DHA (compared to 14/22 and 13/21 in the first 2 groups); none of the DAB + DHA-treated rats developed cirrhosis, cholangiofibrosis or cholangiocysts. Another experiment showed that DHA retarded the appearance of hepatoma. DHA alone had no effect on the liver. Biochemical studies showed that DHA inhibited the formation of the protein-bound dye in the microsomal and supernatant fractions of liver homogenate in the early stages of carcinogenesis and delayed the decrease in the ability of the liver to form this complex in the later stages, when hepatomas appeared.

69-29 ACUTE NUCLEAR MORPHOLOGICAL CHANGE PRODUCED BY DIMETHYLNITROSAMINE IN MOUSE HEPATIC PARENCHYMAL CELLS. (E.) Kume, F. (U. Utah Coll. Med., Salt Lake City) and M. Chiga. Gann 59(2):151-153, 1968.

Single doses of dimethylnitrosamine (D; 10-100 mg i.p.) caused a separation of the azurophilic and non-azurophilic components of the liver cell nucleoli after 30 min.-5 hr. in mice. In mice admin. D at the LD_{50} or less (acute i.p. LD_{50} was approx. 30 mg/kg) and observed after up to 5 days, the nucleolar changes appeared in less than 50% of the cells; the changes were reversed about 5 hr. after treatment. The nucleolar changes were seen in a larger proportion of the cells and their duration was prolonged with higher doses of D. It is suggested that D methylates DNA as well as RNA in the liver.

69-30 PULMONARY TUMORS IN STRAIN A MICE GIVEN INJECTIONS OF AFLATOXIN B_1. (E.) Wieder, R. (Temple U. Med. Sci. Ctr., Philadelphia, Pa.), G. N. Wogan and M. B. Shimkin. J. Nat. Cancer Inst. 40(6):1195-1197, 1968.

In female A/He mice (2 mo. old), 12 i.p. inj. of pure aflatoxin B_1 (AB; 3 inj./wk. of 0.02 mg/g; total 4.8-6.4 mg, av. 5.6 mg or about 700 μM/kg) induced lung tumors of a typical primary adenomatous histology in 100% of the 14/16 survivors (examined 20 wk. after the last AB dose). All mice had multiple lung tumors (av. 5.6 tumors/mouse). The dimethyl sulfoxide vehicle alone did not increase the tumor incidence over that seen in untreated controls. No other tumors were noted in AB-treated mice. On a molar basis, AB has about the same carcinogenic activity as aniline mustard, 4 times the activity of urethan and about 1% of the activity of uracil mustard or 3-methylcholanthrene.

69-31 A CLINICAL AND PATHOLOGIC STUDY OF ENDOCERVICAL LESIONS ASSOCIATED WITH ORAL CONTRACEPTIVES. (E.) Kyriakos, M. (Washington U. Sch. Med., St. Louis, Mo.), R. L. Kempson and N. F. Konikov. Cancer 22(1):99-110, 1968.

Endocervical glandular hyperplasia developed after 2 wk.-6 yr. (mean 20.7 mo.) of treatment with contraceptives (usually combinations of mestranol + norethynodrel, norethisterone or ethynodiol diacetate) in 22 women (age 20-54 yr., mean 35); 3 other pts. developed these lesions during pregnancy, 3 had been treated with single hormones and in 2 other pts. the previous hormone treatment was not determined. The glandular hyperplasia was described as epidermidalization (squamous-columnar cell prosoplasia) in 15 pts., microglandular hyperplasia (seen only during pregnancy or after contraceptive admin.) in 6 pts. and a mixed lesion incorporating features of both in 9 pts. Although this endocervical hyperplasia may be mistaken for adenocarcinoma, it is benign.

69-32 CANCER OF THE LUNG AMONG MEXICAN IMMIGRANT WOMEN IN CALIFORNIA. (E.) Buell, P. E. (State of Calif. Dept. of Public Health, Berkeley, Calif.), W. M. Mendez, J. E. Dunn, Jr. Cancer 22(1):186-192, 1968.

Interviews of surviving relatives of 113 women of Mexican ancestry (20 born in the U. S., 93 in Mexico), who died of lung cancer in California in 1950-1962, showed about the same proportion of each group (5/20 and 22/93, resp.) who had never smoked. The proportion of pts. who had begun smoking before age 15 yr., however, was much higher in the Mexican-born than the American-born pts. (32/93 and 3/20, resp.). There was no significant difference between the groups with respect to early exposure to another possible environmental factor, the flueless stove (fogón) found in poorer Mexican homes. The major differences between Mexican-born and American-born pts. were seen in the oldest group (>65 yr.); 13.1% and 0.1% of these pts., resp., had begun smoking before age 15 yr. This difference was not seen at ages 25-44 yr. The excess risk among Mexican immigrant women fell from about 3-fold in 1949-1953 to about 2-fold in 1958-1962 and the peak ages increased (65-74 and >75 yr., resp.), suggesting that the excess risk was limited mainly to women who had grown up in Mexico before about 1920. In the younger groups, the smoking histories and lung cancer incidence were tending towards the levels of the California female population.

69-33 PERMANENT CHANGES IN THE FINE STRUCTURE OF RAT HEPATOCYTES FOLLOWING PROLONGED TREATMENT WITH 2-ACETYLAMINOFLUORENE. (E.) Flaks, B. (U. Leeds, England). Europ. J. Cancer 4(3):297-304, 1968.

Male Leeds strain albino rats were fed 0.05% 2-acetylaminofluorene (AAF) for up to 10 mo., then returned to an AAF-free diet for 2-6 mo. Liver histology was studied after 1 wk.-10 mo. of AAF admin. and during the AAF-free period; during the latter period, the histological changes were considered premalignant, and all rats had tumors at the end of the study. The early changes in liver histology induced by AAF resembled those caused by other carcinogenic and non-carcinogenic compounds and were regarded as non-specific toxic changes. Permanent changes in the fine structure of premalignant liver cells included hypertrophy, dilation of the granular endoplasmic reticulum, abundant agranular endoplasmic reticulum, decreased mitochondrial size and abnormalities of the cell membrane. These changes were not affected by the presence of liver tumors. At least some of the changes seen in the premalignant cells reflected AAF-induced changes in protein synthesis.

69-34 THE EFFECT OF VITAMIN A ACID ON TUMORIGENESIS AND PROTEIN PRODUCTION. (E.) Prutkin, L. (New York U. Med. Ctr., N. Y.). Cancer Res. 28(6):1021-1030, 1968.

Application of dimethylbenzanthracene (DMBA; 2 doses/wk. of 1% soln. x 6 wk.) to the ears of male albino rabbits induced prominent follicular orifices and sometimes 1-2 very small tumors after 3 wk. of treatment. Application of vitamin A acid (VAA; 2 g/d x 3 after 3 wk. of DMBA and for 6 d after DMBA was stopped) resulted in an increased number of mucus-secreting keratoacanthomas during DMBA application. These tumors reverted to the keratotic form when VAA was stopped. When VAA was resumed the tumors again showed metaplasia and mucus formation, which continued until VAA was stopped. Electron microscopic examination during and after VAA admin. showed reversion from tonofibrils to mucus. Mucus-secreting tumors showed mucigen droplets, tonofibrils, rough-surfaced endoplasmic reticulum and Golgi apparatus. The keratotic tumors showed increased membrane-coating granules and tonofibrils, but no mucigen droplets; autophagocytic vacuoles were also noted during the later stages.

69-35 URETHAN CARCINOGENESIS AND NUCLEIC ACID METABOLISM: IN VIVO INCORPORATION OF PYRIMIDINES-^{14}C AND URETHAN-^{14}C INTO MOUSE ORGANS. (E.) Kaye, A. M. (Weizmann Inst. Sci., Rehovoth, Israel). Cancer Res. 28(6):1047-1054, 1968.

In adult SWR mice treated with urethan (U; 1 mg/g i.p.), the incorporation of ^{14}C-labeled thymine (into DNA) or orotic acid (into RNA and DNA) increased in liver and lung tissue after 17 hr.; spleen uptake of these pyrimidines decreased, reflecting U-induced splenic wt. loss. Pulse-labeling studies showed a reduction of orotic acid incorporation into RNA in the livers of treated mice. This reduction was also seen in mice treated with n-propyl-U (which is much less carcinogenic) or phenobarbital and were attributed to the narcotic effect of U. The ratios of pyrimidine incorporation into DNA and RNA (thymine:cytosine and uracil:cytosine, resp.) remained unchanged, suggesting that U does not specifically inhibit the transamination or transmethylation steps leading to cytosine and thymine in nucleic acids. In newborn mice admin. ^{14}C-labeled U, the background level of $^{14}CO_2$ from U catabolism was 10% of the adult level. No evidence of a U metabolite was found.

69-36 URETHAN CARCINOGENESIS AND NUCLEIC ACID METABOLISM: IN VITRO INTERACTIONS WITH ENZYMES. (E.) Kaye, A. M. (Weizmann Inst. Sci., Rehovoth, Israel). Cancer Res. 28(6):1041-1046, 1968.

Urethan (U) inhibited DNA and RNA methylases only at high levels; the conc. required to cause 50% inhibition was 0.07-0.25 M. At a final conc. of 0.06 M, U did not significantly inhibit these enzymes, DNA, RNA or polyriboadenylate polymerases, acid or alkaline DNase, snake venom phosphodiesterase, ornithine or aspartate transcarbamylase, acid or alkaline phosphatase, enzymes leading to orotic acid synthesis (carbamyl phosphate synthetase, dihydroorotase, dihydroorotate synthetase) or the induction of B-galactosidase in E. coli. Since this conc. of U was >200% of the mouse lethal dose, it is concluded that U does not inhibit mucleic acid metabolism at biologically significant levels.

69-37 EXPERIMENTAL CANCER OF THE LUNG IN RABBITS. (E.) Suzuki, S. (Showa U., Japan). Gann 59(2):163-165, 1968.

Of 30 rabbits treated with 4-nitroquinoline-1-oxide (NQO; 1-4 mg/wk. s.c. until the general condition deteriorated), 23/30 died within the next 32 mo. without showing pathological changes in the lungs. Of the 7 rabbits (2 male, 5 female) surviving 960 days or more, 1 male and 2 females admin. 189-540 mg of NQO (surviving 1410-1710 days) developed no tumors. The other 4 rabbits developed lung tumors of various types (usually adenocarcinoma or large cell carcinoma with giant cells) after 960-1729 days of NQO treatment (total 336-643 mg) and 1 female also developed an endometrial carcinoma without metastases.

69-38 CARCINOGENICITY AND TARGET ORGANS OF METHOXYL DERIVATIVES OF 4-AMINOAZOBENZENE IN RATS. I. 3-METHOXY- AND 3,4'-DIMETHOXY-4-AMINOAZOBENZENE. (E.) Odashima, S. (Sasaki Inst., Tokyo) and Y. Hashimoto. *Gann* 59(2):131-143, 1968.

In male Donryu rats, the only tumor induced by 0.08% 4-aminoazobenzene (AB; p.o.) was 1 fibrosarcoma of the omentum and mesentery. All tumors induced by 4-monomethyl- and 4-(dimethylamino) azobenzene (0.09%) were in the liver (poorly differentiated hepatocellular carcinoma and transitional hepato-cholangiocellular carcinoma), in 21/28 and 24/28 rats, resp. The av. latent period with these agents was shorter than with 3-methoxy-4-AB (0.09%) or 3,4'-dimethoxy-4-AB (0.1%). Tumors induced by these last 2 agents were well-differentiated hepatocarcinoma (21/23 and 24/24, resp.), malignant hemangiopericytoma of the spleen (6/23 and 0/24, resp.), squamous cell carcinoma of the ear duct (2/23 and 1/24, resp.) and tubular adenocarcinoma of the small intestine (0/23 and 2/24, resp.).

69-39 ENHANCED BILIARY EXCRETION OF THYROXINE GLUCURONIDE IN RATS PRETREATED WITH BENZPYRENE. (E.) Goldstein, J. A. (U. Texas Southwest. Med. Sch., Dallas) and A. Taurog. *Biochem. Pharmacol.* 17(6):1049-1065, 1968.

Treatment with benzpyrene (BP; 10 mg i.p.) increased the biliary excretion of exogenous or endogenous thyroxine (T4; in 1 experiment, 0.1 µg/100 g i.v. of ^{131}I-labeled T4) by a factor of 3-4 in male and female Sprague-Dawley rats. The greatest increase was seen in females. Almost all of the increase was accounted for by enhanced biliary T4 glucuronide (T4-G) excretion. The BP-induced increase in T4-G excretion was not seen 4.5-9.5 hr. after BP admin., in contrast to the effects of salicylate, butyl-4-hydroxy-3,5-diiodobenzoate and propylthiouracil. Glucuronide formation from T4 or o-aminophenol was increased *in vitro* in liver from BP-treated rats, apparently as a result of increased T4-glucuronyl transferase activity. Phenobarbital caused a small increase in biliary ^{131}I-T4 excretion, which was not limited to T4-G; it did not affect glucuronide formation from T4 or o-aminophenol *in vitro*.

69-40 INCREASED METABOLIC N-OXIDATION OF 2-NAPHTHYLAMINE IN DOGS AFTER PHENOBARBITAL PRETREATMENT. (E.) Uehleke, H. (U. Tubingen, Germany) and E. Brill. *Biochem. Pharmacol.* 17(7):1459-1461, 1968.

In female dogs treated with the bladder carcinogen 2-naphthylamine (0.5 mmole/kg p.o.) metabolic conversion to 2-nitrosonaphthylamine (NNA) increased to 13.5-22.5% in dogs pretreated with phenobarbital (40 mg/kg x 6 at 2-day intervals i.p.). The phenobarbital pretreated dogs excreted 5.57 mg of nitrosonaphthalene within 8 hr. after admin. while untreated dogs excreted only about 15% of the amount. 2-Nitrosonaphthalene constituted 13.5-22.5% of the total N-oxidation products present in the urine. Control urines revealed however that 6-9% of the 13.5-22.5% nitroso derivatives might be formed during the extraction procedure by oxidation of hydroxylamines even without ferricyanide.

69-41 EFFECTS OF VARIOUS CHEMICAL AGENTS ON DRUG METABOLISM AND CHOLESTEROL BIOSYNTHESIS. (E.) Mitoma, C. (Stanford Res. Inst., Menlo Park, Calif.), D. Yasuda, J. S. Tagg, S. E. Neubauer, F. J. Calderoni and M. Tanabe. *Biochem. Pharmacol.* 17(7):1377-1383, 1968.

Microsome inhibitors, hypocholesteremic agents and insecticide synergists inhibited drug-metabolizing and (especially) cholesterol synthetic systems in rat liver *in vitro*. Plasma cholesterol was not affected by treatment with phenobarbital in rats, but 3,4-benzpyrene (BP; 20 mg/kg/d x 3 i.p.) increased cholesterol levels; both agents stimulated microsomal drug-metabolizing activity. All microsome inducers tested enhanced liver drug-metabolizing activity, except for aminopyrene metabolism in rats admin. 3-methylcholanthrene (50 mg/kg/d x 3 i.p.), which did not affect plasma cholesterol. Unlike phenobarbital, BP did not stimulate either acetate or mevalonic acid incorporation into cholesterol.

69-42 THE EFFECT OF BENZOCARBAZOLES AND BENZACRIDINES ON THE PARALYSING ACTION OF ZOXAZOLAMINE: STRUCTURE/ACTIVITY RELATIONSHIPS. (E.) Buu-Hoi, N. P. (Radium Inst., Paris) and D. P. Hien. *Biochem. Pharmacol.* 17(7):1227-1236, 1968.

A large number of carcinogenic and non-carcinogenic compounds, including carbazoles and benzocarbazoles (34), dibenzo-, naphtho- or other condensed carbazoles (31), polycyclic carbazoles with 1 heterocycle replacing a benzene ring (30), acridines (29), condensed acridines with a heterocycle replacing a benzene ring (5) and arylindoles, indenoindoles and heterocycles related to benzocarbazoles (16), markedly reduced zoxazolamine (Z)-induced paralysis in young male Wistar rats, probably by stimulating Z hydrolase synthesis. Only 9/145 compounds tested were carcinogenic; 8/9 carcinogens were strong inducers of Z hydrolase, the only exception being 4-nitroquinoline-N-oxide, which is not strictly a polycyclic carcinogen. Both biological activities were related to molecular dimensions, *pi*-electron density, nature and site of the substituents and lipid solubility. The non-carcinogenic enzyme inducers (except for the toxic phenylarsazines) had no other demonstrable biological activity.

69-43 ELIMINATION OF N-HYDROXY ARYLAMINES FROM THE BLOOD OF GUINEA PIGS. (E.) Kiese, M. (U. Munich, Germany) and I. Wiedemann. Biochem. Pharmacol. 17(7):1151-1158, 1968.

In guinea pigs, nitrosobenzene (30 mg/kg i.v.) and N-hydroxy-p-aminopropiophenone (5 mg/kg i.v.) levels in the blood fell rapidly, with half-lives of about 2 and 4 min., resp.; 2-nitrosofluorene (NF; 40 mg/kg i.v.) blood levels fell rapidly to about 10 μg/ml, then fell more slowly, with a half-life of 36 min. Guinea pigs treated i.v. with N-hydroxyaniline or N-hydroxy-2-aminofluorene or their N-nitroso analogs also showed rapid elimination of these compounds from the blood. It is concluded that the rapid elimination of the N-hydroxyarylamines by microsomal N-hydroxylation is important in the resistance of guinea pigs to the carcinogenic and ferrihemoglobin-forming action of 2-aminofluorene. In guinea pig RBC in vitro, NF rapidly disappeared from the cells, only a fraction being reduced to the amine.

69-44 TRANSFORMYLATION OF CARCINOGENIC AROMATIC AMINES BY KYNURENINE FORMAMIDASE: DETOXICATION MECHANISM. (E.) Santti, R. S. S. (U. Turku, Finland) and V. K. Hopsu-Havu. Biochem. Pharmacol. 17(6):1110-1113, 1968.

The rates of hydrolysis (in mμmoles/min./mg protein) of various substrates by guinea pig liver kynurenine formamidase (KF) were 23,200-48,000 with chloroacetylanthranilic acid, chloroacetyl-1-naphthylamine and formyl kynurenine, 1800-8000 with formylanthranilic acid, formanilide and acetylanthranilic acid, 425-620 with formyl-1-naphthylamine, acetanilide and acetyl-1-naphthylamine, and 3-22 with acetyl-2-naphthylamine, 4-acetamidobiphenylene and 2-acetamidofluorene, in decreasing order. This and other studies showed that guinea pig liver KF can catalyze the transfer of a formyl group from its physiological substrate N-formyl-L-kynurenine to 1- and 2-naphthylamine and to aniline and anthranilic acid, suggesting that KF may also induce formylation and possibly acetylation of aromatic amines in vivo. KF-catalyzed formylation as a detoxification mechanism is discussed.

69-45 EFFECT OF ANTIOXIDANTS ON PHOTODECOMPOSITION OF BENZO(a)PYRENE. (E.) Rondia, D. (Harvard Med. Sch., Boston, Mass.) and S. S. Epstein. Life Sci. 7(10), Part II: 513-518, 1968.

After 14 hr. of UV irradiation at 24°C (approx. 2000 ergs/sec./cm^2), about 40% of a benzpyrene soln. (BP; 0.2 ug/ml) in aqueous saline with 8% calf serum was photodecomposed. Addition of antioxidants (0.2-200 μg/ml) to the BP soln. usually had no effect, but 4/27 compounds (ascorbic acid, ascorbylpalmitate, tert.-amylhydroquinone and Antabuse) caused a dose-dependent protection. Dose-dependent enhancement of BP photodecomposition was seen with α-tocopherol, 4-hydroxymethyl-2, 6-di-tert.-butylphenol (Ionox-201), 2-(3,5-tert.-butyl-4-hydroxybenzylthio) benzothiazole (Ionox-100) and, to a lesser extent, with buylated hydroxyanisole, α-tocopherol acid succinate and hydroxylamine.

69 46 DISSEMINATED YELLOW FOCI IN LIVERS OF ACETAMIDE-TREATED RATS. (E.) Jackson, B. A. (Cornell Med. Ctr., New York, N. Y.) and G. W. Richter. Arch. Path. 86(2): 142-159, 1968.

Livers of male Sherman rats fed for 4 mo. with 5% acetamide showed disseminated yellow foci after 3 mo. of treatment; some rats developed liver tumors in the later stages (18 mo. after the beginning of treatment). The yellow foci contained globules of lipid (with increased triglyceride and cholesterol ester conc., but no increase in free cholesterol) and other globules not containing glycogen or lipid. Cells of these foci were smaller than normal and showed increased nucleus:cytoplasm ratios. Some of the ultrastructural changes suggested increased functional and proliferative activity, whereas others indicated cellular injury; these changes were interpreted as signs of morphogenesis progressing to tumors.

69-47 USE OF THE LIFE-TABLE TECHNIQUE TO ESTIMATE EFFECTS OF CERTAIN STEROIDS ON PROBABILITY OF TUMOR FORMATION IN A LONG-TERM STUDY IN RATS. (E.) McKinney, G. R. (Mead Johnson Res. Ctr., Evansville, Ind.), J. H. Weikel, Jr., W. K. Webb and R. G. Dick. Toxic. Appl. Pharm. 12:68-79, 1968.

Tumor incidence over 2 yr. in untreated female McCollum rats was: any tumor, 33/90; any malignant tumor, 15/90; benign tumors only, 18/90; and mammary tumors (fibroadenoma or adenocarcinoma, the latter in parentheses), 20/90 (5/20). After 2 yr. of treatment with ethynylestradiol (EE; 30·μg/kg/d x 26 wk., then 60 μg/kg/d x 79 wk.) the tumor incidence was not significantly affected (12/30, 4/30, 8/30 and 10/30 [1/10], resp.). Treatment with 17α-chloroethynyl-3,17β-dimethoxyestra-1,3,5(10)triene (BDH-2700; same doses as EE) increased the tumor incidence (16/30, 7/30, 9/30 and 12/30 [6/12], resp.). Combined treatment with EE (same as above) + megestrol acetate (MA; 1.2 and 2.4 μg/kg/d, same regimen as EE) caused a reduction in tumor incidence that was not quite significant at the 5% level (7/30, 1/30, 6/30 and 6/30 [0/6], resp.). A prolonged sequential course of EE (30 μg/kg/d x 16), followed by EE (same dose) + MA (1.5 mg/kg/d) for 5 d, followed by 7 d of rest and a repeated cycle (26 cycles over 104 wk., then a 1-wk. course of EE) caused a significant reduction of tumor incidence (3/30, 1/30, 2/30 and 2/30 [0/2], resp.). Adenoma or adenocarcinoma of the pituitary was second in frequency to mammary tumors (15/92 and 1/92, resp., including 11 controls); 9 rats (including 7 controls) developed uterine tumors. Tumor types involved a wide range of organs and histological types.

69-48 ENHANCEMENT OF 7,12-DIMETHYLBENZ(α)ANTHRACENE LEUKAEMOGENESIS IN MICE BY NEONATAL INJECTION OF CORTISONE ACETATE. (E.) Nishizuka, Y. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan) and H. Shisa. Brit. J. Cancer 22(2):290-295, 1968.

The leukemia incidence at age 26 wk. in Swiss albino (non-inbred), C57Bl/6J or A/Jax (inbred) mice admin. 1 s.c. inj. of dimethylbenzanthracene (DMBA; in 1% gelatin) within 24 hr. after birth (60 μg) or at age 3 days (100 μg) was approx. 85%, 24% and 30%, resp. In mice admin. cortisone acetate (CA; 0.15-0.2 mg × 1 i.p.) in the neonatal period, followed by DMBA (100 μg × 1 s.c.) at age 2-10 days, the leukemia incidence (thymic lymphoma) was significantly increased (87.9%, 74.1% and 71.4%, resp.) and the mean latent period significantly reduced (86, 116.4 and 158.6 days, resp.) in all strains. Swiss mice seemed to be the most susceptible to DMBA leukomogenesis. Pretreatment with CA did not increase lymphoma incidence in these mice significantly, however, it caused a reduction of the mean latent period by 20-30 days. When DMBA exposure was followed by cortisone or when both treatments were given simultaneously 24 hr. after birth to this strain of mice there was a reduction in incidence (57.1%, mean latent period 117.2 days; and 42.8%, mean latent period 109.4 days).

69-49 TUMOURS OF THE INTESTINES INDUCED IN RATS BY INTRAPERITONEAL INJECTIONS OF N-METHYL- AND N-ETHYL-N-NITROSOURETHANES. (E.) Schoental, R. (Med. Res. Council Lab., Carshalton, Surrey, England) and J. P. M. Bensted. Brit. J. Cancer 22(2):316-323, 1968.

Carcinogenesis by N-methyl-N-nitrosourethan (MNU; 1 or 2 doses at a 5-mo. interval) or N-ethyl-N-nitrosourethan (ENU; 3 or 4 doses at 0, 7 and 14 days and 9.5 mo.) was studied in Porton-derived rats; each agent was admin. as a 10^{-2} M ethanol soln. (0.1-0.25 ml i.p.). Early g.i. injuries induced by both agents included ulceration, adhesions and mucosal hypertrophy. ENU induced g.i. tumors in 2/5 males and 1/3 evaluable females; most tumors were adenomas or adenocarcinomas of the ileum or cecum, with 1 epidermoid carcinoma of the forestomach. MNU induced tumors in 12/18 males and 4/4 evaluable females (including 7/12 males admin. 1 dose), including 8 g.i. adenomas, 10 lung tumors (8 adenomas, 1 adenocarcinoma, 1 carcinoma), 2 testicular or seminal vesicle tumors (mesothelioma and anaplastic carcinoma, resp.) and 4 other tumors (cervix carcinoma, splenic adenocarcinoma, fibrosarcoma of the leg, retro-orbital sarcoma). Multiple tumors developed in 7 rats admin. MNU. Other MNU-induced changes included pulmonary congestion, intestinal intussusception and (in 1 female) mucosal hyperplasia of the renal pelvis. No liver tumors were induced by either agent. Most g.i. tumors involved the ileum or cecum.

69-50 ENDOCRINE DIFFERENCES BETWEEN RATS BEARING SIMPLE AND MALIGNANT MAMMARY TUMOURS INDUCED BY 9,10-DIMETHYL-1,2-BENZANTHRACENE. (E.) Hamilton, T. (U. Med. Sch., Edinburgh, Scotland) and A. Sneddon. Brit. J. Cancer 22(2): 324-329, 1968.

In female Sprague-Dawley rats treated with dimethylbenzanthracene (DMBA; 20-70 mg p.o.), the mortality rate (34/120 = 28.3%) and tumor incidence (44/86 survivors = 53%) increased with dosage, as did the proportion of malignant mammary tumors (adenocarcinoma). In 8 rats with "simple" mammary tumors (fibroadenoma), ovarian wt. was significantly reduced and pituitary wt. was significantly increased, by comparison to 36 rats with malignant mammary tumors, DMBA-treated rats without tumors, and untreated controls. This endocrine difference was seen at all doses of DMBA. No significant changes in adrenal wt. were noted. No obvious histological changes were noted in the adrenals and pituitaries of tumor-bearing rats. The ovaries of 6/8 rats with solitary fibroadenomas showed a relative absence of corpora lutea, follicular cysts, scanty interstitial tissue and small follicles in various stages of development. These changes were less frequent in the ovaries of rats with malignant tumors (7/36), DMBA-treated non-tumor-bearing rats (2/44) and untreated controls (0/10). These ovarian changes suggested FSH stimulation.

69-51 A STUDY OF SOLUBLE PROTEIN AND SULFHYDRYL LEVELS IN THE RAT LIVER DURING RAPID NORMAL AND PREMALIGNANT GROWTH. (E.) Argus, M. F. (U. S. Public Health Service Hosp., New Orleans, La.), J. A. Walder, J. A. Fabian and J. C. Arcos. Brit. J. Cancer 22(2):330-341, 1968.

The role of sulfhydryl (SH) groups and the h proteins (cytoplasmic components of the covalent azo dye carcinogen-liver protein complex found before the appearance of liver tumors) in regenerating liver, rapid liver growth induced by 20-methylcholanthrene (MCA; 1 mg/50 g i.p.) and during diethylnitrosamine (DENA; av. 650 μg/d in drinking water) carcinogenesis was studied in male Sprague-Dawley rats. The total h protein fraction showed a large, reversible decrease after partial hepatectomy, reaching minimum levels after 37 hr., coinciding with a reversible increase of the SH levels of total soluble proteins and a reversible increase in the mitotic rate. MCA caused a marked but temporary increase in hepatic mitotic rate and total soluble protein SH levels in weanling rats, but did not affect the h protein levels. The h proteins increased during 10 wk. of DENA admin. (max. after 1 wk.), roughly parallel to an increase in soluble protein SH levels. The mitotic rate gradually increased during this time. DENA-induced liver tumors showed a lower h protein content than normal liver.

69-52 DNA-DEPENDENT DYE BINDING BY ORAL EPITHELIUM: ITS RELATION TO SMOKING HABITS.

(E.) Roth, D. (New York U. Med. Ctr., N. Y.), A Oppenheim and D. T. Fredrickson. Arch. Environ. Health (Chicago) 17(1):59-61, 1968.

Quantitative changes in acriflavine binding (in proportion to cellular DNA content) were studied in oral epithelial samples from 807 subjects, mostly men. In samples from 350 nonsmokers, the mean binding rate (in 10^{-6} μg/cell) was 1.72; binding levels above 2.3 (the minimum seen in oral or upper respiratory cancer) were seen in 3.7% of the group (13/350). The dye uptake values in samples from 100 cigar smokers were not significantly different from control values. In samples from 257 cigarette smokers, mean values were 1.79-2.02 (above 2.3 in 56/257); a significant increase was seen in heavy smokers. A significant increase in dye binding was also noted in pipe smokers (mean 1.86; above 2.3 in 6/100 samples) and in subjects smoking cigarettes, pipes and cigars (mean 1.74; above 2.3 in 3/40 samples). In a small group of subjects who stopped smoking, dye binding values fell to normal after 6 mo. of abstinence.

69-53 CHEMICAL MUTAGENS IN THE HUMAN ENVIRONMENT.

(E.) Epstein, S. S. (Harvard Med. Sch., Boston, Mass.) and H. Shafner. Nature (London) 219:385-387, 1968.

A screening method for mutagenic compounds, studying the frequency of dominant lethal mutations (fetal deaths) in the offspring of treated male and untreated female Swiss (CD-1) mice, is described. The highest frequency of dominant lethals was seen in the offspring of males treated during the postmeiotic stage of spermatogenesis. Numerous carcinogens, pesticides, organic extracts of air and water, drugs and other chemicals were tested. Aflatoxin and benzo(a)pyrene increased the mutation rate by a factor of 11, but 10 other carcinogens (benzanthracene, butter yellow, cumene hydroperoxide, 1,2,3,4-diepoxybutane, dimethylhydrazine, dimethylnitrosamine, hydrazine, 3-methylcholanthrene, 4-nitroquinoline-1-oxide, urethan) and the organic extracts of air and drinking water were not mutagenic under these conditions.

69-54 HORMONAL DEPENDENCE OF DNA SYNTHESIS IN MAMMARY CARCINOMA CELLS IN VITRO.

(E.) Turkington, R. W. (Duke U., Durham, N. C.) and R. Hilf. Science 160(3835):1457-1458, 1968.

In explants of a spontaneous, virus-associated mammary adenocarcinoma from C3H/HeJ mice, DNA synthesis was stimulated by insulin (5 μg/ml) and inhibited by estrogens to about the same extent as DNA synthesis in normal or pregnant mammary gland. The relative potency of the estrogens was estradiol (1.0), estriol (1.0), diethylstilbestrol (0.5) and estrone (0.4). In explants of the spontaneous, transplantable R3230AC mammary adenocarcinoma of Fischer rats, DNA synthesis was begun independently of both insulin and estrogens. It is concluded that autonomous growth with respect to these hormones is correlated with rapid growth, but is not an essential characteristic of these tumor cells.

69-55 CIGARETTES: CHEMICAL EFFECTS OF SODIUM NITRATE CONTENT.

(E.) Terrell, J. H. (Houdry Lab., Air Products ond Chem., Inc., Linwood, Pa.) and I. Schmeltz. Science 160(3835):1456, 1968.

Addition of an 8.3% soln. of sodium nitrate to commercial unfiltered cigarettes significantly reduced the level of toxic, carcinogenic compounds (benzpyrene, nicotine, phenol) in the smoke, but caused a marked increase (at least doubling) of undesirable vapor-phase constituents such as acetaldehyde, acrolein, acetonitrile and nitrogen oxides, which reduce ciliary movement. Levels of CO, CO_2, HCHO and HCN remained unchanged, while H_2S levels were significantly reduced. Levels of low-boiling olefinic hydrocarbons were increased in proportion to the decrease in paraffin levels.

69-56 BENZO(a)PYRENE IN GASOLINE PARTIALLY PERSISTS IN AUTOMOBILE EXHAUST.

(E.) Begeman, C. R. (Gen. Motors Res. Labs., Warren, Mich.) and J. M. Colucci. Science 161:271-272, 1968.

A relatively new automobile engine in good condition, fueled with commercial gasoline containing ^{14}C-labeled benzo(a)pyrene (BP; 1.1 ppm with label + 1.0 ppm in the gasoline at the time of purchase), was operated under simulated city driving conditions and the BP distribution studied. The amounts of BP surviving combustion differed in 2 runs (0.1% and 0.21%), but an av. of 36% of the BP in the exhaust fumes came from the BP originally in the gasoline. Another 5% of the BP accumulated in the crankcase oil. Some of the BP in the gasoline was converted into other polynuclear aromatic hydrocarbons and other more polar compounds, ranging from alkylbenzenes to oxygenated compounds.

69-57 SEPARATION AND IDENTIFICATION OF POLYCYCLIC HYDROCARBONS IN RUBBER DUST.

(E.) Smith, C. G. (U. Oklahoma Med. Ctr., Oklahoma City, Okla.), C. A. Nau and C. H. Lawrence. Amer. Industr. Hyg. Ass. J. 29(3):242-246, 1968.

A new analytical procedure (spectrophotometry and thin-layer chromatography) is described. The conc. of 3,4-benzpyrene (BP), 1,2-BP, fluoranthene (FA) and pyrene was about the same in furnace black, new rubber (from tires supplied by 4 manufacturers) and old rubber (from worn tires). Commercial furnace black and furnace black deposited in the lungs of monkeys were analytically similar in that both contained adsorbed 1,2-BP, pyrene and perhaps fluoranthene, with 2 other unidentified fluorescent compounds; however, no 3,4-BP or coronene was present in furnace black from monkey lungs.

69-58 PLASMA PROTEIN CHANGES IN EXPERIMENTAL CANCER (FIBROSARCOMA IN MICE). (E.) Srinivasa Rao, V. (Indian Inst. Sci., Bangalore, India) and M. Sirsi. Indian J. Exp. Biol. 6(1): 13-14, 1968.

In male SWR/IISc mice bearing transplanted fibrosarcomas originally induced by 6:12-dimethylbenzo-1:2b:4:5b-dithionaphthene, marked hypoproteinemia was seen in the late stages (45 days after inoc.). Albumin levels were reduced from 40% to 30%, α-globulins from 7.1 to 6.2 g% and γ-globulins from 19.3 to 5.4 g%, while β-globulins increased from 30 to 54 g%. The increase in β-globulins may reflect the production of immunoglobulins directed against the tumor, but the marked reduction in γ-globulins was attributed to reduction or absence of the immune response, possibly resulting from toxic factors released by the interaction of the host tissues and the tumor cells.

69-59 TESTOSTERONE EXCRETION IN CADMIUM CHLORIDE INDUCED TESTICULAR TUMORS IN RATS. (E.) Favino, A. (U. Pavia, Italy), A. Cavalleri, G. Nazari and M. Tilli. Med. Lavoro 59(1):36-40, 1968.

Testosterone (T) and epitestosterone (ET) excretion was studied in Sprague-Dawley rats with Leydig cell hyperplasia and tumors induced 13 mo. previously by cadmium ($CdCl_2$; 1 mg/100 g x 1 s.c.). Urinary T levels in tumor-bearing and control rats were 0.042-0.048 and 0.163 μg/24 hr., resp. No ET was detected under basal conditions. After admin. of human chorionic gonadotropin (75 I.U./day x 6), ET excretion was higher in tumor-bearing rats than in controls (av. 0.83 and 0.50 μg/24 hr., resp.). It is concluded that cadmium-injured Leydig cells, after an initial period of suppression (no T or ET was detected in another group of rats in the early stages of cadmium injury), recover part of their ability to secrete T.

69-60 EFFECTS OF THE NEONATAL INJECTION OF A CARCINOGEN ON THE INDUCTION OF TUMOURS BY THE SUBSEQUENT APPLICATION TO THE SKIN OF THE SAME CARCINOGEN. (E.) Grant, G. A. (Roy. Cancer Hosp., London), R. L. Carter, F. J. C. Roe and M. C. Pike. Brit. J. Cancer 22(2):346-358, 1968.

In Wistar inbred rats admin. methylcholanthrene (MC) at birth (100 μg-1 mg s.c.) and topically from age 7-57 wk. (0.3 ml of 0.15% acetone soln., 2 doses/wk. x 25 wk.; in 1 group, continued for another 25 wk. with 0.3% soln.), the frequency of sarcomas at the inj. site and the latent period were dose-dependent at all doses in females. In males, the 2 higher doses (300 μg and 1 mg) had about the same effects, while the lowest dose was less carcinogenic. The tumor incidence was reduced in animals painted with acetone instead of MC following neonatal MC admin. The s.c. inj. of 100 μg of MC in gelatin delayed the development of epithelial tumors in females, but not males, in response to topical MC application. In random-bred Swiss mice treated neonatally with MC (31-125 μg) and later with topical MC applications, the responses were not dose-dependent. In mice admin. 3,4-benzpyrene (BP; 10 or 40 μg) at birth, the number of skin tumors induced by later BP applications was reduced only in mice admin. the higher dose of BP neonatally.

69-61 ADRENAL LIPID AND PLASMA CORTICOSTERONE DEPLETION AFTER 7,12-DIMETHYLBENZ(a)-ANTHRACENE ADMINISTRATION TO THE ALBINO RAT. (E.) Dale, E. (U. Kentucky, Lexington) and F. D. Scutchfield. Experientia 24(7):723-724, 1968.

In female Sprague-Dawley rats admin. dimethylbenzanthracene (DMBA; 20 mg x 1 p.o.), av. plasma corticosterone (CS) levels fell steadily from 15 μg/100 ml (controls) to 2.3 μg/100 ml after 72 hr. Partial recovery of adrenal function thereafter was indicated by an increase in plasma CS to 9.4 μg% at 120 hr. This dose of DMBA caused g.i. intolerance but was not high enough to cause fatal adrenal failure. Surviving animals developed mammary tumors, but the relationship of tumor development to adrenal hypofunction could not be determined.

69-62 PULMONARY DISEASE AND AIR POLLUTION: A CHICAGO PROBLEM. (E.) Carnow, B. W. (U. Illinois Sch. Med., Chicago). Chicago Med. 71(15):581-586, 1968.

The relationships between air pollution levels and chronic respiratory diseases, including bronchogenic carcinoma, are discussed. The Chicago Department of Air Pollution Control maintains 19 monitoring stations throughout the city, which have recorded air pollution data since 1963. The city av. levels of sulfur dioxide (SO_2) in 1965-1967 were 0.068-0.091 ppm (lowest in 1967) in the winter, 0.029-0.037 ppm (lowest in 1965) in the spring, 0.018-0.027 ppm (lowest in 1967) in the summer and 0.036-0.051 ppm (lowest in 1967) in the fall. The highest recorded level was 1.4 ppm over 3 hr. in April, 1966; by comparison, the av. SO_2 level over 3 days during the London catastrophe of December, 1952 (when 4000-6000 excess deaths were recorded) was 1.3 ppm. The SO_2 level above which the morbidity and mortality rates from respiratory disease begin to increase (0.3 ppm or even less) was frequently noted in Chicago, particularly in the Hyde Park area where the av. SO_2 level in January, 1966 was 0.249 ppm.

69 63 HISTOLOGICAL CHANGES IN THE ORAL MUCOSA OF THE WISTAR RAT TREATED WITH COMMERCIAL LIME (CALCIUM HYDROXIDE)--AN OPTICAL AND SUBMICROSCOPIC STUDY. (E.) Sirsat, S. M. (Cancer Res. Inst., Bombay) and S. V. Kandarkar. *Brit. J. Cancer* 22(2):303-314, 1968.

Histological changes in the palate and oral mucosa were studied in weanling Wistar rats treated for up to 12 mo. with slaked lime ($Ca(OH)_2$; 5 paintings/wk.). Palatal changes in 115 lime-treated rats included mild, moderate or massive hyperplasia with a prominent stratum granulosum (115), hyperkeratosis (96), cytoplasmic vacuolization with large nuclei and 1 or several nucleoli (50), invagination of the rete pegs into the papillary layer (59) and frank acanthosis (26). The mast cell response was increased and subepithelial hyalinization was also noted. All lime-treated animals also showed inflammatory changes in the epithelial and connective tissues. These changes were most marked in rats fed protein- or vitamin B-deficient diets or animals treated with deoxycorticosterone acetate (2 inj./wk. of 1 mg into palate; total 12-56 mg over 1-6 mo.) before lime admin. was begun. Histological changes were more severe in the buccal mucosa than in the palate. No significant sex differences were noted. Solvent treated controls showed no cellular atypia or acanthosis. The possible cocarcinogenic effects of slaked lime in habitual betel nut users are discussed.

69-64 EFFECT OF SPLENECTOMY ON HEPATIC TUMORIGENESIS: A MORPHOLOGICAL STUDY. (E.) Sengupta, P. (Inst. Postgrad. Med. Ed. & Res., Calcutta, India) and B. K. Aikat. *Brit. J. Cancer* 22(2):296-302, 1968.

Intact and splenectomized (splx.) Wistar rats (age 3-4 mo.) were fed 3'-methyl-4-dimethylaminoazobenzene (MDAB; 0.06% in food or 6 mg x 6 days/wk.) for 20 wk.; liver morphology was studied after 4-20 wk. of MDAB treatment. In intact animals, focal (usually periportal) hepatocellular necrosis was seen in the early stages of treatment; reactive changes (including rapid mesenchymal proliferation and accumulation of mononuclear cells) were encountered most frequently in these areas. Active bile duct cell proliferation, often associated with marked mesenchymal reactions and active fibroblast aggregation, appeared after 10-14 wk., at which time the foci of necrosis were small. Tumors (hepatoma or mixed type) appeared after 16-20 wk. in nearly all animals, but cirrhosis did not appear and the areas of tumor development were not related to the areas of active regeneration. The character of the initial cellular injury and the later regenerative and reactive changes were markedly changed by splx. Benign tumors (duct cell adenoma) were seen more frequently than malignant tumors (cholangiocarcinoma). The initial injury consisted of widely scattered foci of necrosis, marked duct cell proliferation, mesenchymal reactions and active regeneration. Possible relationships between MDAB carcinogenesis and immunity (altered by splx.) are discussed.

69-65 SUGGESTED MEASURES FOR LESS HARMFUL CIGARETTES. A--RECOMMENDATIONS BY INDIVIDUALS; B--SUMMARY OF WORKSHOP. (E.) Homburger, F., G. E. Moore, F. G. Bock, T. Dalhamn, R. Rylander and W. B. Kannel. Pp. 271-282 in *Toward a Less Harmful Cigarette*. *NCI Monograph 28*, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Regulatory standards for cigarette packaging (warning labels, information about the nicotine and tar content); the definition of a filter and a minimum filter size (30 mm in length is suggested); standards for max. content of nicotine, tar (15 mg/cigarette is suggested) and possibly other components; and quality control of additives including pesticide residues are recommended. Other measures suggested are the promotion of nicotine-free cigarettes, the redesign of cigarettes to discourage inhalation and more extensive studies of smoking and health, with particular reference to the nicotine and tar intake as affected by the brand of cigarette used.

69-66 INITIATORS AND PROMOTERS IN TOBACCO CARCINOGENESIS. (E.) Van Duuren, B. L., A. Sivak, L. Langseth, B. M. Goldschmidt and A. Segal. Pp. 173-180 in *Toward a Less Harmful Cigarette*. *NCI Monograph 28*, Wynder, E. L. and D. Hoffmann (Eds.). Washington, U. S. Government Printing Office, 1968, 282 pp., $3.75.

Tobacco tar constituents and synthetic hydrocarbons were tested for skin tumor (papilloma or carcinoma)-initiation or -promoting activity in female ICR/Ha mice. Application of single doses of coronene or dibenz(a,c)anthracene (non-carcinogenic) and 6-methylanthracene (weakly carcinogenic) induced tumors when croton resin was applied as the tumor promoter. Of 17 phenols, coumarins and related compounds, the only tumor-promoting agent was phenol. A barium hydroxide extract of tobacco leaf also promoted tumors in mice treated with 7,12-dimethylbenz(a)anthracene. Brief heating of menthol (up to 700°C) did not yield a significant amount of degradation products in the absence of a catalyst. It is suggested that noncarcinogenic compounds may initiate tumors, which can be promoted by tobacco tar constituents.

69-67 EXPERIMENTAL STUDIES ON THE INHIBITION OF CARCINOGENESIS BY CIGARETTE-SMOKE CONDENSATES AND CARCINOGEN-RELATED SUBSTANCES. (E.) Homburger, F., A. Treger and E. Boger. Pp. 259-270 in *Toward a Less Harmful Cigarette*. *NCI Monograph 28*, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office 1968, 282 pp., $3.75.

Nicotine-free smoke extracts (SE) from 5 American brands of cigarettes were tested. In female A/He mice, treatment with SE (0.5 mg/mo. i.v. x 5) from age 7 wk. reduced the incidence of spontaneous lung adenomas by 50-90%, although the number of tumors/mouse remained unchanged. Results in older mice (20-38 wk.) suggested regression of formed tumors. SE (10 mg/wk. x 2, then 2 inj./wk. of 5 mg i.p.) significantly reduced the growth of sarcomas induced in male C57BL/6 B10 mice by 3,4,9,10-dibenzpyrene (DBP; benzo(rst)pentaphene; 0.5 mg s.c.), although the tumor incidence was unchanged. Transplanted s.c. sarcomas induced by DBP were also inhibited by SE (1 mg/day x 14 i.p.). Tumor induction by DPB (500 µg s.c.) was significantly inhibited by admin. of DBP-5,8-diol acetate, DBP-5,8-diol dibenzoate and particularly DBP-5,8-quinone (500 µg s.c., 2 wk. after DBP admin.). The incidence of lung adenomas in A/J mice was also significantly reduced by DBP quinone (500 µg i.v. x 2 at a 1-mo. interval) and to a lesser extent by the other 2 derivatives. Inhibition of 1-day-old Sarcoma 180 by DBP quinone (500 µg/day x 7 i.p.) was sufficient to classify this compound as an antitumor agent; the other derivatives were less effective but caused significant tumor inhibition. These DBP derivatives may be of too low volatility to serve as tobacco additives; studies of more volatile derivatives that would release these compounds during combustion are recommended.

69-68 QUANTITATIVE RELATIONSHIPS BETWEEN CIGARETTE SMOKING AND DEATH RATES. (E.) Hammond, E. C. Pp. 3-8 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

The mortality rate/100,000 man-yr. in 36,863 nonsmoking American men (age 45-54 yr.) was 402. In 75,324 cigarette smokers, mortality rates in men smoking 1-9, 10-19, 20-39 and 40+ cigarettes/day at the time of study were 741, 910, 970 and 1109, resp. Correction of the data to indicate habitual cigarette consumption (accounting for men who temporarily reduced cigarette consumption because of illness) resulted in mortality rates in these groups of 571, 836, 982 and 1124, resp. The smoker:nonsmoker (adjusted to 1.0 in non-smokers) mortality rates from lung cancer at age 35-54, 55-69 and 70-84 yr. were 6.17, 3.53 and 5.32, resp., at 1-9 cigarettes/day; 3.90, 8.77 and 9.62, resp., at 10-19 cigarettes/day; 9.37, 13.82 and 17.62, resp., at 20-39 cigarettes/day; and 7.67, 17.47 and 29.84, resp., at 40+ cigarettes/day. A similar increase in mortality rates from coronary heart disease by age and cigarette consumption was noted.

69-69 RELATIONSHIP OF NUMBER OF CIGARETTES SMOKED TO "TAR" RATING. (E.) Waingrow, S. and D. Horn. Pp. 29-33 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Of 2337 American smokers interviewed as to cigarette consumption in 1962, 1466 subjects were interviewed again in 1964-1966 in a nationwide survey. The repeat interviews excluded subjects described as nonsmokers in the first survey. In the first survey of 1265 men and 1072 women, the men reported a higher av. daily cigarette consumption (0-14 cigarettes/day in 307/1258, 15-34/day in 733/1258 responding subjects) than the women (412/1072 and 574/1072 responding subjects, resp.). Av. tar consumption, based on published data of tar contents of several brands of cigarettes, was also higher in men than in women; the "tar ratings" of cigarettes smoked were 10-20 mg in 119/1265 men and 225/1072 women, compared to 50 mg in 448/1265 and 205/1072, resp. Changes in cigarette consumption between the 2 interviews were reported by 43.5% of the group; cigarette consumption was increased in 26.6% and reduced in 26.4%. The brands were changed to cigarettes of higher or lower tar content in 10.3% and 11.5%, resp. In subjects changing to lower-tar brands, the number reporting a higher cigarette consumption (27.3%) was the same as in the group as a whole.

69-70 EFFECT OF FILTER CIGARETTES ON THE RISK OF LUNG CANCER. (E.) Bross, I. D. J. Pp. 35-40 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffman (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Data were obtained for 974 white men with lung cancer seen at the Roswell Park Memorial Institute in 1960-1963 and a corresponding group of men without malignant disease. The relative risk (in multiples of the non-smoker risk) of lung cancer was studied in 200 pts. currently smoking non-filter cigarettes and 65 pts. using filter cigarettes. In 21 pts. who smoked regular cigarettes (including those smoking over 1 pack/day) for 30 yr. or less (low exposure to cigarette smoke) the relative risk was about 3; in 5 low-exposure pts. smoking filter cigarettes it was 1.4. In "medium-exposure" pts. (under 1 pack/day for 30-50 yr.), the relative risks with regular and filter cigarettes (76 and 26 pts., resp.) were 5.6 and 3.9, resp. In the "high-exposure" group (over 1 pack/day for 30 yr. or more), the relative risks with regular and filter cigarettes (64 and 25 pts., resp.) were 12.0 and 5.4, resp. The differences were significant in all groups. It is concluded that filter cigarettes reduce the lung cancer risk by about 40%, by comparison to non-filter cigarettes, although the risk is still about 4-fold higher than in nonsmokers.

69-71 THE EFFECT OF DIRECT CIGARETTE SMOKE INHALATION ON THE RESPIRATORY TREE OF DOGS. (E.) Auerbach, O., E. C. Hammond, D. Kirman, L. Garfinkel and A. P. Stout. Pp. 65-77 in *Toward a Less Harmful Cigarette*. *NCI Monograph 28*, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

A gradually increasing number of cigarettes (up to 12/day) was smoked by 10 tracheostomized beagles (9 male, 1 female); 5/10 died during treatment (24 days in 1/5, 229-415 days in 4/5) and the others were sacrificed after 421-423 days. All treated dogs showed hyperplasia of the mucous glands of the tracheobronchial tree; the glands also showed distended goblet cells and a progressively increasing number of atypical nuclei. None of the untreated controls showed such changes. in the controls, the brochial epithelium showed 1 or 2 rows of basal cells and a layer of ciliated columnar cells. In treated animals, the bronchial epithelium had 3-4 rows of basal cells with or without ciliated columnar cells; if no ciliated cells were present, the surface epithelium resembled a layer of squamous cells. These changes progressed with time, as did the proportion of atypical nuclei in the epithelium.

69-72 EFFECT OF DIFFERENT DOSES OF TOBACCO SMOKE ON CILIARY ACTIVITY IN CAT. VARIATIONS IN AMOUNT OF TOBACCO SMOKE, INTERVAL BETWEEN CIGARETTES, CONTENT OF "TAR," NICOTINE, AND PHENOL. (E.) Dalhamn, T. Pp. 79-87 in *Toward a Less Harmful Cigarette*. *NCI Monograph 28*, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Ciliotoxicity was examined in the tracheal epithelium of cats treated with commercial cigarette smoke under several experimental conditions. The av. number of puffs from unfiltered smoke required to induce ciliostasis was 91, compared to 170 after reduction (by filters) of the gaseous phase, 194 after reduction of the particulate phase and 512 after reduction of both phases. If all of the particulate phase ("tar" including nicotine and phenol) was eliminated, ciliostasis was seen after an av. of 600 puffs. A good correlation (0.74-0.69) was seen between the tar and nicotine levels and ciliotoxicity, with an 0.56 correlation to the gaseous phase components including toluene. Ciliostasis was also well correlated with the time between cigarettes (0.15 min.) and the size of the puff (1-20 ml); ciliostasis was always reduced by filtration of the smoke (Cambridge type or cellulose acetate).

69-73 "TAR" AND NICOTINE LEVELS OF AMERICAN CIGARETTES. (E.) Moore, G. E. and F. G. Bock. Pp. 89-94 in *Toward a Less Harmful Cigarette*. *NCI Monograph 28*, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Tar delivery from 70-mm American cigarettes was 4-34 mg/cigarette; without filters, it was 27-36 mg. Tar delivery from 85-mm (king size) cigarettes was 6-36 mg. Filters ranged from very good to nearly useless, reducing tar yield to 6-34 mg/cigarette, but the 5 most popular brands (unspecified) were of below-av. tar content. Cigarettes with long overwraps yielded less tar in the last puffs, because the wrap increased the butt length. The 100-mm cigarettes had the highest tar yield (median 25 mg/cigarette); only 1 brand delivered less than 25 mg (it had a 50-mm overwrap) and 8/12 delivered more than 35 mg/cigarette. Nicotine levels (0.2-2.6 mg/cigarette) were within 1 standard deviation of the regression line of tar content in most cases. It is concluded that tar levels can be reduced by effective filters, long overwraps, perforations near the butt and restriction of the length of the cigarette.

69-74 EFFECT OF FARM PRODUCTION PRACTICES ON NICOTINE AND TOTAL PARTICULATE MATTER IN CIGARETTE SMOKE. (E.) Tso, T. C. Pp. 97-111 in *Toward a Less Harmful Cigarette*. *NCI Monograph 28*, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Analysis of several randomly selected genetic varieties of American-grown tobacco showed wide interstrain differences in the conc. of sterols, nitrate, alkaloids and phenols. Nitrogen fertilized Burley-57 or Hicks tobacco showed an increase in nicotine (N) conc., but the total particulate matter (TPM) conc. of the smoke was reduced in the flue-cured tobacco (Hicks) and increased in air-cured leaves (Burley-57). The TPM level was dependent on the quantity of tobacco/cigarette. Air curing increased the N content. In air-cured Burley tobacco, the N and TPM levels were lowest when suckering was controlled by hand and next lowest after treatment with methyl pelargonate and methyl caprate. In flue-cured tobacco, TPM levels were lowest after sucker control by a 1:1 octanol-decanol mixture. The N content gradually rose as the leaf ripened, but neither N nor TPM levels were affected by the curing rate. It is concluded that the N and (to a lesser extent) TPM levels of tobacco can be modified by genetic selection, cultivation practices and possibly curing methods.

69-75 RECONSTITUTED TOBACCO-LEAF TECHNOLOGY: A TOOL FOR TOBACCO-SMOKE MODIFICATION. (E.) Moshy, R. J. and H. M. Halter. Pp. 133-148 in *Toward a Less Harmful Cigarette*. *NCI Monograph 28*, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

The composition of smoke from leaf/stem blends of high or low nicotine content (2.26% or 1.37%, resp.) was studied in a smoking-machine experiment. Each lot included 1 natural-leaf and 4 reconstituted samples. The benzo(a)pyrene and phenol contents were reduced up to 45% and 87%, resp., in most reconstituted tobacco sheets, compared to the natural-leaf samples; the levels of both tar constituents were particularly low in the low-nicotine samples.

69-76 SELECTIVE REDUCTION OF THE TUMORIGENICITY OF TOBACCO SMOKE. EXPERIMENTAL APPROACHES. (E.) Hoffmann, D. and E. L. Wynder. Pp. 151-172 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

The only tobacco smoke fraction with tumor-initiating activity (mouse skin) was B-1 (about 0.6% of the dry tar fraction), a portion of the neutral fraction containing all of the polynuclear aromatic hydrocarbons (PAH). The largest component of B-1 (6.9%) was skatol (S). A synthetic admixture of 17/36 of the PAH present in B-1 did not initiate tumors in the absence of S; addition of an indole-carbazole subfraction of B-1 (free of PAH) to the synthetic PAH mixture was even more active than the PAH mixture + S. In addition to 36 PAH, fraction B-1 contained 10 N-heterocyclic hydrocarbons, 2 insecticides, some of their pyrolysis products and smaller amounts of esters, weakly polar carbonyl compounds, olefins, paraffins, terpenes and quinones. Treatment with alkali nitrates (potassium, sodium, copper, etc.) significantly reduced the pyroformation of PAH in cigarette smoke condensate, thereby also reducing its tumor-initiating properties. Selection of high-nitrate tobacco strains and the use of reconstituted tobacco sheets with or without added nitrates also reduced tumor induction by the smoke condensate.

69-77 FREE RADICALS AS POSSIBLE CONTRIBUTORS TO TOBACCO-SMOKE CARCINOGENESIS. (E.) Cooper, J. T., W. F. Forbes and J. C. Robinson. Pp. 191-197 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U.S. Government Printing Office, 1968, 282 pp., $3.75.

Free radical (FR) formation was studied by electron spin resonance in preparations of tobacco smoke condensate (TSC) and model hydrocarbons. Several polynuclear hydrocarbons, including known carcinogens, produced reasonably stable FR, probably of the RO- type (where R = hydrocarbon) after heating. Acidified preparations of TSC or carcinogenic hydrocarbons (e.g., benzo(a)pyrene) had spectra indicating stabilization of unpaired electrons. Preliminary data from studies of model compounds suggested that the type of FR formed depends on smoking conditions (amounts of air and water present, state of aggregation, etc.). Possible biological effects of FR are discussed on the basis of a literature survey (14 references), although no direct evidence of a relationship between FR formation and tumor initiation exists.

69-78 EXAMINATION OF AFLATOXIN IN TOBACCO AND IN CIGARETTE SMOKE. (E.) Tso, T. C. P. 213 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

No aflatoxin B_1 was detected in high-grade Burley, Maryland or flue-cured tobacco leaves, in moldy samples of flue-cured tobacco, or in cigarette smoke condensate. No aflatoxin B_1 was recovered from the smoke of aflatoxin-treated cigarettes.

69-79 GASEOUS COMPONENTS OF TOBACCO SMOKE. (E.) Grob, K. Pp. 215-220 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

About 20% of the constituents of tobacco smoke consists of gases other than air (about 8% is particulate matter); over 90% of this gaseous phase consists of carbon dioxide, water and other biologically unimportant compounds. The only substance of biological interest is carbon monoxide (about 3.2% of whole cigarette smoke). Organic compounds comprise not more than 1.5% of the gaseous phase. This organic fraction contains at least 500 components, about 200 of which have been identified. Inorganic compounds include gases of nitrogen and sulfur. The low molecular wt. hydrocarbon fraction resembles that of cracking products of petroleum, except for the presence of isoprene; the ratio of saturated and alkene compounds to dienes is about 3:1. Gas chromatography of the organic vapors with various functional groups revealed about 400 peaks (167 neutral compounds have been at least partially identified). Identification of the strongly acidic components, the basic amines and the less volatile components at the borderline between the gaseous and particulate phases is very difficult.

69-80 CARBOXYHEMOGLOBIN IN RELATION TO SMOKING. (E.) Curphey, T. J. Pp. 231-235 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann. (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

Blood carbon monoxide (CO) saturation was studied in 1078 autopsy cases from the Los Angeles area, whose smoking habits were ascertained by questionnaires answered by relatives or friends. The range of CO saturation in this group was 0-11.6%. In 80% of 366 nonsmokers and ex-smokers, the CO level was 1% or less with an abnormally high level (over 5%) in 1 pt., an ex-smoker. In 546 smokers, the CO level was below 1% in 22% and over 5% in 45 pts.; av. CO levels were about 50% lower in pts. over 65 (455 nonsmokers, 121 smokers). The mean CO level in male nonsmokers was nearly double the mean level in females, but no sex differences were seen in the smokers. CO levels increased with tobacco consumption. The relationship between tobacco consumption and disease in this group could not be determined.

69-81 SELECTIVE REMOVAL OF COMPONENTS OF TOBACCO SMOKE BY FILTRATION. (E.) George, T. W. Pp. 237-248 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

The selectivity numbers (S_x; ratio of the conc. of compound x in unfiltered cigarettes to its conc. in smoke from filtered cigarettes) for several tobacco smoke constituents after filtration were studied. Under conditions where 10-40% of the particulate fraction was removed, S_x values of 4.0 or more indicated about 90% removal of compound x. Addition of bonding agents to the filter fiber increased the S_x of some filters by a factor of 2; in 1 experiment, selective filtration of phenols (P) was increased from 2.1 (triacetin without cellulose acetate) to 3.7-4.8 (with 6/9 filters containing triethyl citrate or various polyethers). Selectivity was increased by longer filters, but fell 50% as the filter's age increased (filtration of P by a cellulose acetate-5% glycerol triacetate filter is illustrated). Cellulose acetate filters did not selectively filter nicotine from American tobaccos. Addition of activated carbon or other particles to a cellulose acetate filter did not increase the S_x value for P, but selective filtration of acrolein, HCN or formaldehyde was increased. Selective filtration of H_2S, ammonia, methyl isocyanate, acetone or acetaldehyde by a charcoal filter was increased only during the first few puffs; these compounds were released from the filter with later puffs.

69-82 COMMENTS ON SELECTIVE CIGARETTE-SMOKE FILTRATION. (E.) Tiggelbeck, D. Pp. 249-258 in Toward a Less Harmful Cigarette. NCI Monograph 28, Wynder, E. L. and D. Hoffmann (Eds.). Washington, D. C., U. S. Government Printing Office, 1968, 282 pp., $3.75.

The filtration of acrolein, acetaldehyde and other vapor phase constituents of cigarette smoke through glass tubes containing 10-mm layers of activated charcoal was studied. In 1 experiment, best filtration of acrolein was seen with coconut charcoal and the earliest breakthrough with charcoal from paper process residue. The best charcoals had a large proportion of the surface area in small pores. However, another experiment with acetaldehyde showed that charcoals with small pores also need wide entry pores to enhance penetration of the charcoal by the vapors.

Selective vapor filtration was also enhanced by chemical impregnation of the charcoal. Charcoals also showed a general selectivity towards the particulate phase of cigarette smoke.

69-83 ENHANCED GROWTH OF TRANSPLANTED TUMOURS AFTER TREATMENT WITH CYTOTOXIC AGENTS. (E.) Calcutt, G. (Mt. Vernon Hosp., Northwood, Middlesex, England). Biochem. Pharmacol. 17(8):1742-1744, 1968.

Very low doses of antitumor agents (50% or less of the MTD) stimulated the growth of ascites NK/Ly lymphoma, a Degranol (D)-resistant variety (NK/R), solid Sarcoma 180 (S-180) and a plasma cell tumor (PTC) in mice. Tumor growth stimulation at various doses (in parentheses, as fractions of the MTD) was 6-16% with TEM (12.5%) in NK/Ly and NK/R; 1-aminocyclopentane carboxylic acid (ACPC; 50%) in S-180; D or DL-o-sarcolysin (25%) in S-180 and PTC, resp.; and dimethyl Myleran (3.1%) in S-180. Tumor stimulation of 18-30% was seen with ACPC or chlorambucil (CB; 3.1%) in NK/Ly, methotrexate (25%), mannitol Myleran (12.5%) or thio-tepa (TSPA; 3.1%) in NK/R, or D (12.5%) in PTC. Tumor stimulation of 32-41% was seen with CB (3.1%), triethylene glycol diglycidyl ether (Eponate; 6.25%) or ACPC (6.25%) in NK/R and with TSPA (6.25%) in S-180. Urethan also stimulated S-180 at low doses. Since doses below and above the tumor-stimulating level inhibited these tumors, the tumor stimulation was attributed to suppression of an immune response, which in turn permitted further tumor growth.

69-84 POLYCYCLIC HYDROCARBONS FROM CIGARETTE SMOKE CONDENSATE. A METHOD FOR THE FRACTIONATION OF LARGE QUANTITIES FOR ANIMAL EXPERIMENTS. (Ger.) Elmenhorst, H. (Inst. of Scientific Res., Hamburg, Germany) and G. Grimmer. Z. Krebsforsch. 71:66-73, 1968.

Treatment of 100-g aliquots of tobacco smoke condensate with cyclohexane + methanol (90 vol.% cyclohexane), fractionation of the cyclohexane phase with nitromethane + cyclohexane (80 + 20 vol.%, resp.) and silica gel column chromatography of the nitromethane phase (in 20 + 80 vol.% benzene + cyclohexane), yields a fraction accounting for only 1.1% of the total condensate, which contains over 85% of the pyrene, anthracene, phenanthrene, fluoranthene, benz(a)anthracene, chrysene, benz(a or ε)pyrene, perylene, benz(ghi)perylene, dibenz(a,h)anthracene and coronene present in the original condensate. This fraction is free of the nicotine alkaloids and phenols; 94% and 84%, resp., are in another fraction.

69-85 RELATIONS BETWEEN STEROIDS AND CARCINOGENIC COMPOUNDS (V). 2-ACETOAMINO- AND 3-ACETOAMINO-$\Delta^{1,3,5(10)}$-ESTRATRIENE AND 3-AMINO-$\Delta^{1,3,5(10)}$-ESTRATRIENOL-(17β). (Ger.) Dannenberg, H. (Max-Planck Inst., Munich, Germany), I. Brachmann and C. Thomas. Z. Krebsforsch. 71:74-80, 1968.

Single s.c. inj. of 2- or 3-acetaminoestra-1,3,5-(10)-triene (I and II, resp.; 5 mg in tricaprylin) induced fatal pulmonary edema in 17/17 male and female SaB mice. In NMRI mice, I or II (2.5 mg x 3 at 2-mo. intervals s.c.) induced no tumors at the inj. site, but the tumor frequency elsewhere was higher than in controls, particularly in the females. Tumors in 3/9 I-treated males included leukemia, spindle cell carcinoma of the paw and keratinized squamous cell carcinoma of the skin with renal metastases (1 each); tumors in 5/6 females included mammary adenoma (4) or carcinoma (1) and uterine hydrometra (1). Tumors in 2/4 II-treated males included reticulum cell sarcoma (1) and lymphatic leukemia or reticulosis (1); 7/7 females developed mammary adenoma (5) or carcinoma (1) and ovarian cysts (2). Tumors in vehicle (tricaprylin)-treated controls included hepatic hemangioendothelioma and blast cell leukemia in 1/8 males (each) and mammary adenoma (1) or carcinoma (3) and splenic reticulum cell hyperplasia (1) in 5 females. In SaB mice admin. I or II (1 mg/wk. s.c. x 14 and 7 wk., resp.), I induced skin papillomas in 1/8 males in 2/8 females and mammary adenoma in 1/8 females. II induced myosarcoma of the foot in 1/5 males and mammary carcinoma in 2/8 females (1/2 also developed a skin papilloma). Tumors in the vehicle (glycerine)-treated controls included a sebaceous gland adenoma (1/7 males) and mammary carcinomas (2/9 females). In SaB mice (11 males, 6 females), skin painting with 3-aminoestra-1,3,5(10)-trienol-17β (III; 2 doses/wk. of 2 drops of 0.4% acetone soln.; duration not stated) induced no tumors; force-feeding of III to Sprague-Dawley female rats (100 mg in 2 doses over 7 days) resulted in a mammary carcinoma in 1/10 (no tumors developed in an unspecified number of controls). It is suggested that I and II are transaminated in the liver to a p-quinol-(10β) form, which reacts with pyridoxamine-5'-phosphate to form a Schiff base, which undergoes acid hydrolysis to form III.

69-86 THE CARCINOGENIC ACTIVITY OF 3-AMINO-$\Delta^{1,3,5(10)}$-ESTRATRIENE AND 2-NITROSOFLUORENE. (Ger.)

Hecker, E. (German Cancer Res. Ctr., Munich, Germany), M. Traut and M. Hopp. Z. Krebsforsch. 71:81-88, 1968.

Comparable doses (15 µmoles/100 g/dose in sesame oil: 2 doses/wk. x 42 wk.) of 2-acetylaminoestra-1,3,5(10)triene (AAE), N-acetyl-N-(3-estra-1,3,5-(10)-trienyl)hydroxylamine (N-OH-AAE), 2-acetylaminofluorene (AAF) and 2-nitrosofluorene (NF) were fed by stomach tube to Wistar rats; each group had the same number of males and females at the beginning of treatment. AAE (16 rats) and N-OH-AAE (10 rats) showed no carcinogenic activity. AAF feeding (total 2.81/kg = 12.6 mmoles/kg) induced tumors in 10/16 rats: 1 squamous cell carcinoma and 1 neurofibroma of the ear duct and 6 hepatocellular carcinomas among males and 3 squamous cell carcinomas of the ear duct among females. NF (total 2.46 g/kg = 12.6 mmoles/kg) caused tumors in 4/10 animals: 2 squamous cell carcinomas of the ear duct, 2 squamous cell carcinomas of the forestomach (with liver metastases), 1 hepatocellular carcinoma and 1 intestinal adenocarcinoma in the males and 1 squamous cell carcinoma of the skin among the females. Urinalysis of the AAE- and AAF-fed rats (throughout the experiment) showed that the AAF-fed rats excreted N-OH-AAF and 3-, 5- and 7-hydroxy-AFF, but no N-OH-AAE was ever found in the urine of AAE-fed rats. The structure-activity relationship of estrogenic and carcinogenic compounds and their metabolism in connection with the possible ultimate carcinogens produced are discussed. AAE was not carcinogenic at these doses and has little activity at higher doses, but shows significant estrogenic activity after s.c. admin. in mice.

69-87 INVESTIGATIONS ON EXPERIMENTAL LEUKEMIAS (VII). ADENOMAS SARCOMAS AND LEUKEMIAS IN MICE AFTER SUBCUTANEOUS INJECTIONS OF 3-HYDROXYKYNURENINE. (Ger.)

Ehrhart, H. (U. Munich, Germany), W. Ried, W. Benoit and H. Dörfler. Z. Krebsforsch. 71:1-6, 1968.

Rüdiger strain white mice were treated s.c. with 3-hydroxykynurenine in aqueous soln. (5 mg x 20 or 35, total 100 or 175 mg/20 g mouse, resp.; 1 dose every 3.4 or 4.2 days x 77 or 270 days, resp.). Of 140/200 mice surviving the treatment period, 32 developed malignant tumors: 8 myeloid leukemias (6 mature cell type, 2 immature cell type), 10 sarcomas (8 lymphosarcoma, 2 fibrosarcoma), 11 small cell alveolar adenocarcinomas (8 thyroid, 2 pancreas, 2 undetermined), 2 mammary carcinomas and 2 bladder carcinomas. Leukemias and sarcomas developed in 14 mice admin. a total dose of 100 mg/20 g mouse and in 4 mice admin. 110-175 mg; 7 of the adenocarcinomas were first noted after admin. of 130-175 mg and 4 after a total dose of 100 mg.

69-88 INDUCTION OF NEPHROBLASTOMAS IN THE RAT WITH DIMETHYLNITROSAMINE. (E.)

Hadjiolov, D. (Oncological Res. Inst., Sofia). Z. Krebsforsch. 71:59-62, 1968.

Adult male albino rats (local strain) were treated with dimethylnitrosamine (DMN) in the drinking water at 1 mg/day (total 195 mg) or 2 mg/day (total 420 mg) and were sacrificed after 240 and 270 days, resp. No spontaneous tumors developed in 150 untreated controls. Of the rats admin. the lower dose of DMN, 4/10 showed large renal tumors and 6/10 had nodular and cystic lesions of the liver; 1/10 also had a papilloma of the ureter. The larger dose of DMN induced nephroblastomas in 12/15 animals and many rats showed grayish nodules of hyperplastic tissue in the contralateral kidney. These contained proliferating young cells with oval nuclei and scanty cytoplasm (called "oval cells"), which were quite similar to those in the tumor and either grew profusely or formed small nests. The histology of the highly anaplastic renal tumors (nephroblastoma type) induced by DMN suggested that they developed from primitive, poorly differentiated stem cells. It was assumed that the continuous parenchymal damage induced by DMN caused regeneration of these blastic reserve cell elements in the kidney which, because of their metanephrotic potentialities, ultimately led to malignant transformation.

69-89 CARCINOGENIC ALKYLATING SUBSTANCES. II. BIS(MORPHOLINO)METHANE. (Ger.) Druckrey, H. (Max-Planck Inst., Freiburg i. Br., Germany), R. Preussmann, J. Bücheler and S. Ivankovic. Z. Krebsforsch. 71:105-108, 1968.

In BD rats, treatment with bis(morpholino)methane in oil soln. (1 inj./wk. s.c. of 50 mg/kg x 40 wk., total 2 g/kg; LD_{50} = 1 g/kg) induced giant cell tumors at the inj. site in 9/12 rats; these rats died after 392-587 days and some metastases to the lungs were seen. One tumor was a neurosarcoma, the others were myosarcomas or myxosarcomas. The other 3/12 animals died without tumors (from pneumonia). By comparison, 1 rat inj. with a single dose of bis(N-methylanilino)methane (850 mg/kg) died after 495 days with a polymorphocellular fibrosarcoma at the inj. site and 2 inguinal solid tumors of mixed histology (squamous cell carcinoma and adenocarcinoma). It is concluded that aminoalkylating agents have weak but definite carcinogenic activity.

69-90 CARCINOGENIC ACTIVITY OF PHENYLNITROSOUREA. (Ger.) Preussmann, R. (Max-Planck Inst., Freiburg i. Br., Germany), H. Druckrey and J. Bücheler. Z. Krebsforsch. 71:63-65, 1968.

To further test the hypothesis that cancer as an "effect of reinforcement" can be induced by a single dose of a carcinogen, phenylnitrosourea (PNU), which is highly unstable and at room temperature and pH 7.4 decomposes to the phenyldiazonium ion within 5 min., was admin. (single s.c. inj.) to a group of BD rats (number not stated). The LD_{50} was established at 150 mg/kg of a 10% soln. in dimethyl sulfoxide. Ten of the rats surviving this dose of PNU were further observed; 4/10 died within 1 yr. and 4/6 of the other surviving rats developed rapidly growing spindle cell sarcomas at the inj. site and died after 456-479 (2/4) or 618-654 days (2/4).

69-91 MUCOSAL TUMORS OF THE FORESTOMACH OF MICE AFTER FEEDING BENZPYRENE. (Ger.) Griem, W. (U. Mainz, Germany) and K. Engelhardt. Z. Krebsforsch. 71:109-112, 1968.

In male and female NMRI mice treated for an unspecified time with 3,4-benzpyrene (BP; 10 μg/ml) and a 3% tensid soln. (T; "Pril liquid") in the drinking water, papillomas and carcinomas of the forestomach mucosa developed in 29/126 and 49/126, resp. The carcinomas included 1 Darier-type epithelioma and 48 squamous cell carcinomas (34 with keratinization). Treatment with BP + T + potassium chromate (500 ppm) induced forestomach papillomas and carcinomas in 30/106 and 35/106, resp.; all carcinomas were the squamous cell type and 24 were keratinized. In these 2 groups, there was no significant sex difference; papillomas developed in 26% of the females and 24% of the males (41/158 and 18/74, resp.) and carcinomas in 36% and 36% (57/158 and 27/74), resp. Treatment with T alone induced forestomach papillomas and skin carcinomas in 5/126 and 2/126 mice, resp. Treatment with T + potassium chromate induced forestomach papillomas in 10/101, 1 reticulum cell sarcoma and 1 lymphosarcoma. The av. survival time in mice with papillomatosis was 448 days, compared to 475 days in mice with carcinoma; av. survival times in mice with keratinized and non-keratinized squamous cell carcinomas were 501 and 416 days, resp.

69-92 INDUCTION OF TUMORS IN RATS WITH PROCARBAZINE HYDROCHLORIDE. (E.) Kelly, M. G. (NCI, Bethesda, Md.), R. W. O'Gara, S. T. Yancy and C. Botkin. J. Nat. Cancer Inst. 40(5): 1027-1051, 1968.

In Osborne-Mendel rats, the antitumor agent procarbazine (P; 50-250 mg/kg/wk. x 8 i.p. and p.o. in newborns; 50 or 100 mg/kg/wk. x 10 or 500 or 1000 mg/kg x 1 i.p. or p.o. in 4- or 6-wk.-old females) induced mammary adenocarcinomas in 90-100% of the females and 70% of the males, with median latent periods of 13-19 and 27 wk., resp. Other tumors in newborn females included 1 uterine hemangioendothelioma and 3 septal cell lung tumors; other tumors in newborn males included 4 kidney sarcomas, 2 splenic hemangiomas, 3 squamous cell cysts of the skin, 3 septal cell lung tumors, 5 hemangioendotheliomas (3 spleen, 1 each liver and kidney), 2 jejunal tumors (1 adenocarcinoma, 1 adenomatous polyp), duodenal carcinoma, leukemia, fibrosarcoma and rhabdomyosarcoma (1 each). Fischer rats (8-16 wk. old in 6 studies, 4-6 wk. old in 2 studies) were less susceptible to carcinogenesis by P (0.5 or 1.0 mg/kg x 1 p.o.; 50 or 100 mg/kg/wk. x 10 i.p. or p.o.; 250 mg/kg/wk. x 4 p.o.). Mammary tumors (usually adenocarcinomas) were seen in 25/59 females surviving 11 wk. or more, with median latent periods of 34-43 wk.; the incidence increased with dosage (20-60%). None of the surviving males developed mammary tumors. Kidney sarcomas developed in 5/18 males and 22/58 females (30% and 40%, resp.) and septal cell lung tumors in 3 rats (1 female, 2 males). Squamous cell carcinomas of the ceruminous and sebaceous glands developed in 15% of the females and 30% of the males; 10% of the females developed uterine tumors (5 endometrial sarcomas, 3 endometrial polyps, 1 fibroleiomyoma). Other tumors (1 rat each) included jejunal leiomyosarcoma, adrenal ganglioneuroma, lymphosarcoma, reticulum cell sarcoma, rhabdomyosarcoma and fibrosarcoma. None of the rats in either group survived 1 yr.

69-93 TRANSPLANTABILITY OF CYCASIN-INDUCED TUMORS IN RATS, WITH EMPHASIS ON NEPHROBLASTOMAS. (E.) Hirono, I. (Nat. Inst. Arthritis and Metabolic Diseases, Bethesda, Md.), G. L. Laqueur and M. Spatz. J. Nat Cancer Inst. 40(5):1011-1025, 1968.

Attempts to transplant 23 tumors induced in Osborne-Mendel (1; male), Sprague-Dawley (4 male, 3 female) or Fischer rats (9 male, 6 female) by cycasin (C; 14 rats; s.c. admin. to newborn Fischer rats) or feeding with C, (1 rat), C aglycone (3 rats) or cycad meal (5 rats), were successful in 21 cases. Successfully transplanted tumors included 2 hepatomas, 2 colon carcinomas, 1 rhabdomyosarcoma, 1 retroperitoneal schwannoma and 15/16 kidney tumors (9/10 nephroblastomas, 3 sarcomas, 1 adenoma, 1 carcinoma, 1 papilloma). Serial transplantation of the nephroblastomas was sex-dependent; tumors induced in males grew slowly or not at all in females, and vice versa. This sex-dependence was not seen in rats inoc. with the renal sarcomas. In 6 of the nephroblastoma lines (FC-V-3, FC-II-10, FC-II-7, FC-IV-8, FC-II-4, #21912) and 1 kidney sarcoma (FC-III-4), tumor growth rates increased after 3-4 (3 tumors), 8-11 (2 tumors) or 16-17 transplant generations (2 tumors). When the tumor growth rate increased the sex dependence (if any) disappeared. Attempts to convert 3 sarcomas and 7 nephroblastomas to ascites tumors were unsuccessful.

69-94 TUMOR INDUCTION IN FISCHER AND OSBORNE-MENDEL RATS BY A SINGLE ADMINISTRATION OF CYCASIN. (E.) Hirono, I. (Nat. Inst. Arthritis and Metabolic Diseases, Bethesda, Md.), G. L. Laqueur and M. Spatz. J. Nat. Cancer Inst. 40(5):1003-1010, 1968.

In newborn Fischer rats admin. β-D-glucosyloxyazoxymethane (cycasin; C; 2.5 mg x 1 s.c.), 82 tumors developed in 22/27 males and 24/28 females surviving 6 mo. No tumors developed at the inj. site. The tumor incidence was slightly higher in males than in females (47:35), particularly the incidence of hepatoma (3:0) and large intestine tumors (7 colon adenomas, 1 rectal carcinoma, 1 duodenal sarcoma; 6 males, 3 females). The incidence of tumors of the kidney (34; 10 each nephroblastoma and interstitial cell tumors, 6 sarcomas, 3 each adenomas and papillomas, 2 hemangiomas), liver adenomas (18), alveolar cell adenomas of the lung (12) or brain gliomas (5) was about the same in males and females; 1 male also developed an adenoma of the preputial gland. In weanling male Osborne-Mendel rats admin. 1 intragastric dose of C (100-1250 mg/kg), the acute LD_{50} was calculated at 562 mg/kg. A total of 52 tumors developed in 25/36 of the 6-mo. survivors; most involved the kidney (28) or intestine (16). Neurogenic sarcomas developed in 4 rats; the incidence of hepatoma and lung tumors was low (2 each). In weanling male Osborne-Mendel rats admin. C (750 mg/kg) alone or + either cysteamine (0.1 or 0.2 g/kg) or 3-amino-1,2,4-triazole (1 or 3 g/kg), only the animals admin. the protectors survived beyond 72 hr. Tumors developed in 31/31 of the 6-mo. survivors; these involved the kidney (46/79 tumors), liver (5/79; no hepatomas), brain (1 glioma) or intestine (20/79). Other tumors included 2 leiomyosarcomas (large intestine), 1 angioma (diaphragm), 1 pancreatic carcinoma, 1 bladder sarcoma and 2 neurogenic sarcomas (cecum and pericardium). The protective agents admin. to this group did not induce tumors when admin. alone. The times for tumor induction were about the same in each group (minimum 200-222 days).

69-95 NUCLEOLAR BEHAVIOR IN REGENERATING LIVER OF RATS RECEIVING INTRA-ABDOMINAL INJECTIONS OF AZO DYES AND THIOACETAMIDE. (E.) Mironescu, S. (Inst. Oncology, Bucharest), I. Encut, K. Mironescu and F. Liciu. J. Nat. Cancer Inst. 40(5):917-933, 1968.

Liver histology was studied in partially hepatectomized male Wistar rats 3 or 7 days after the beginning of treatment with thioacetamide (TAA; 25-150 mg/kg/day x 3 or 7 i.p.), carbon tetrachloride (CCl_4; 1 ml/kg of 40% soln. x 1 s.c.) or single i.p. doses of 4-aminoazobenzene (AB), 4-dimethylaminoazobenzene (DAB) or 3'-methyl-4-dimethylaminoazobenzene (MDAB; each 50-400 mg/kg). Dose-dependent structural damage of the genome, as shown by chromosome bridges, was seen in rats admin. the liver carcinogens DAB, MDAB and TAA. This chromosomal damage was apparently a prerequisite to later nucelolar damage (anisonucleolinosis), but nucleolar damage did not always follow chromosomal damage, as noted in the CCl_4-treated animals. No nucleolar damage was seen in the livers of rats admin. the non-carcinogenic AB. Nucleolar lysine-rich proteins increased as nucleolar damage developed, particularly with TAA. The liver carcinogens also induced an increase in intranucleolar Feulgen-positive granules, whereas AB and CCl_4 did not.

69-96 CARCINOGENIC ACTIVITY OF ANALOGUES OF p-DIMETHYLAMINOAZOBENZENE. VI. ACTIVITY OF THE METHYL-5'-QUINOLINE ANALOGUES. (E.) Brown, E. V. (U. Kentucky, Lexington) and J. J. Duffy. J. Nat. Cancer Inst. 40(5):891-893, 1968.

The liver carcinoma-inducing effects of substituted methyl-5'-quinolines (MeQ5'; 0.03% in diet unless otherwise stated) were studied in rats. Q5' itself was the most active (tumors in 9/10 after 4 mo. at 0.01% and in 10/10 after 2 mo. at 0.03%); 2'-MeQ5' and 7'-MeQ5' both induced tumors in 10/10 after 2 mo. At 0.01%, 8'-MeQ5' induced tumors in 10/10 after 2 mo.; higher doses were toxic. The next lowest activity was seen with 2-MeQ5' and 3-MeQ5' (tumors in 10/10 after 4 mo. with each agent); 3'-MeQ5' induced tumors in 10/10 at 6 mo., but no tumors were seen after 4 mo. of admin.; 6'-MeQ5' induced tumors in 9/9 only after 9 mo. By comparison, p-dimethylaminoazobenzene (0.03% or 0.06%) induced liver carcinomas in 5/10 and 9/10, resp., after about 5.5 mo. The order of carcinogenic activity in the MeQ5' series was about as expected on the basis of comparable studies in the benzene series, except for the low activity of 3'-and 6'-MeQ5'.

69-97 STUDIES ON CHEMICAL CARCINOGENS. VI. REDUCTIONS OF 3- AND 8-SUBSTITUTED 4-NITROQUINOLINE 1-OXIDES. (E.) Kawazoe, Y. (Nat. Cancer Ctr. Res. Inst., Tokyo) and M. Araki. Chem. Pharm. Bull. 16(5):839-847, 1968.

69-98 LESION OF THE LUNG IN RATS CONTINUOUSLY EXPOSED TO TWO PARTS PER MILLION OF NITROGEN DIOXIDE. (E.) Freeman, G. (Stanford Res. Inst., Menlo Park, Calif.), R. J. Stephens, S. C. Crane and N. J. Furiosi. Arch. Environ. Health (Chicago) 17(2):181-192, 1968.

69-99 ALTERED GENE EXPRESSION DURING DIFFERENTIATION: POPULATION CHANGES IN HYBRIDIZABLE RNA AFTER STIMULATION OF THE CHICK OVIDUCT WITH OESTROGEN. (E.) O'Malley, B. W. (NCI, Bethesda, Md.), W. L. McGuire and P. A. Middleton. Nature (London) 218(5148):1249-1251, 1968.

See also abstract nos.: 3,4,6,7,8,14,16,17,26,158,169,175

Most abstracts in this section are supplied by the National Cancer Institute. Names of the abstractors are presented for each abstract. Unsigned abstracts have been prepared by Medical Literature, Inc.

68-100 EVIDENCE FOR VIRUSES IN ACUTE LEUKEMIA AND BURKITT'S TUMOR. (E.) Henle, W. (Children's Hosp., Philadelphia, Pa.). Cancer 21(4):580-586, 1968.

The present knowledge concerning the herpes-like virus (EB virus) associated with Burkitt's lymphoma is reviewed and discussed. (D. Pinkel)

68-101 SPECIFIC IMMUNOFLUORESCENCE TEST FOR THE HERPESTYPE EB VIRUS OF BURKITT LYMPHOBLASTS, AUTHENTICATED BY ELECTRON MICROSCOPY. (E.) Epstein, M. A. (Middlesex Hosp. Sch. Med., London) and B. G. Achong. J. Nat. Cancer Inst. 40(3):593-607, 1968.

Sera from rabbits immunized with purified herpestype virus from Burkitt lymphoblasts (EB3 strain) were conjugated with fluorescein isothiocyanate. Two of these sera gave a brilliant fluorescence with EB3 cells but did not react with normal human lymphoid cells, Hela cultures, amnion cells or embryo lung fibroblast cultures. Control conjugated rabbit antiserum to a bacterial antigen did not react with EB3 cells. In positive tests on EB3 cells, the number of fluorescing cells was about 33% of the number of cells containing virus as seen by electron microscopy. (E. Y. Lasfargues)

68-102 ELECTRON MICROSCOPIC STUDIES OF HUMAN GRANULOCYTES: STRUCTURAL VARIATIONS RELATED TO FUNCTION. (E.) Zucker-Franklin, D. (N.Y.U. Sch. Med., New York). Seminars Hemat. 5(2):109-133, 1968.

Current knowledge pertaining to the ultrastructure of peripheral blood neutrophils, eosinophils and basophils and the functional variations which these cells undergo under a variety of conditions is reviewed. The neutrophils, eosinophils and basophils are noted in relation to disparities in function of these cells. The review of normal granulocyte structure, with references to a number of detailed studies, provides a frame of reference for studies on virus-like particles seen in normal and diseased granulocytes. Other articles in this symposium on polymorphonuclear leukocytes include discussions of phagocytosis, WBC metabolism and the detection of transplantation antigen in WBC. (P. H. Levine)

68-103 MIXED TUMORS OF HUMAN SALIVARY GLAND. (E.) Welsh, R. A. (La. State U. Medical Center, New Orleans) and A. T. Meyer. Arch. Path. 85(4):433-477, 1968.

Electron microscopic study demonstrated the coexistence of epithelial and mesenchymal tissues in these tumors. Reference is made to an experimental study of Dawe et al., showing that the induction of salivary gland tumors by polyoma virus was dependent upon the presence of a complex of epithelium and specific salivary gland mesenchyme. Apparently a dependent interaction of epithelium and mesenchyme is necessary for a polyoma virus tumor formation in these glands. (I. Koprowska)

68-104 INCREASED NUMBERS OF A CHARACTERISTIC TYPE OF RETICULAR CELL IN THE THYMUS AND LYMPH NODES OF LEUKEMIC MICE: AN ELECTRON MICROSCOPE STUDY. (E.) Izard, J. (Sloan-Kettering Inst. Cancer Res., N. Y.) and E. de Harven. Cancer Res. 28(3):421-433, 1968.

A characteristic type of cell, the dense reticular cell, is described and illustrated by electron microscopy in the thymus and lymph nodes of mice, and special preservative methods required for their fixation for electron microscopy are discussed. It is suggested that this is a distinctive cell when compared with macrophages and epithelial reticular cells of the thymus. Of interest is the fact that the frequency of these cells, very low in normal tissue, is greatly increased in leukemic AKR mice. (J. D. Hare)

68-105 CROSS-RESISTANCE TO THE TRANSPLANTATION OF SYNGENEIC FRIEND, MOLONEY, AND RAUSCHER VIRUS-INDUCED TUMORS. (E.) Glynn, J. P. (NCI, Bethesda, Md.), J. L. McCoy and A. Fefer. Cancer Res. 28(3):434-439, 1968.

Immunofluorescence data are presented which confirm the previously reported cytotoxic antibody studies suggesting that Friend, Moloney and Rauscher (FMR) virus-induced lymphomas possess similar surface antigens not shared by Gross lymphomas. Cross-resistance studies were performed to determine whether tumors induced by FMR and Gross virus shared transplantation antigens. Mice were pretreated with either infectious FMR viruses, FMR lymphomas or a Gross lymphoma and challenged with syngeneic FMR and Gross lymphoma. FMR viruses and their tumors stimulated immunity to all FMR tumors, but not to Gross lymphoma. Immunization with Gross lymphoma failed to induce resistance to the transplantation of the FMR lymphomas, but also failed to induce resistance to itself. The results suggest that FMR lymphomas possess related or identical transplantation antigens. (J. D. Hare)

69-106 THE USE OF HAEMOPOIETIC HETEROCHIMERAS FOR THE DETECTION OF LEUKAEMOGENIC VIRUS. (E.) Mathe, G. (Paul-Brousse Hospital, 94-Villejuif, France), R. Motta and S. Sorieul. Brit. J. Cancer 22(1):145-148, 1968.

A system is proposed which uses hemopoietic chimeras to detect a leukemogenic virus. The work showed that Friend virus can be demonstrated in a rat-mouse heterospecific chimera. It is suggested that chimeras of human hemopoietic cells in the monkey might be used to detect leukemogenic viruses in man. (G. H. Warren)

69-107 INDUCTION OF BONE MARROW COLONY-STIMULATING ACTIVITY BY A FILTERABLE AGENT IN LEUKEMIC AND NORMAL MOUSE SERUM. (E.) Foster, R., Jr. (Roswell Park Mem. Inst., Buffalo, N. Y.), D. Metcalf and R. Kirchmyer. J. Exp. Med. 127(5):853-866, 1968.

The reported inducing agent was demonstrable in 49/58 sera from leukemic Swiss mice but only in 10/80 sera from normal mice. It had the nature of a virus but its properties differed sharply from those of the stimulating agent itself. The latter agent was regarded as similar to or identical with the LDH-elevating virus of Riley et al. (J. B. Nelson)

69-108 ANTIBODY PRODUCTION BY MICE INFECTED WITH SELECTED MURINE ONCOGENIC AGENTS. (E.) Millian, S. J. and M. Schaeffer. Cancer 21(5):989-999, 1968.

The immune capacities of mice with Friend or Rauscher virus leukemia were tested. Antigenic materials included inactivated polyvalent influenza virus, Coxsackie A9 virus, diphtheria-pertussis-tetanus (DPT) vaccine, diphtheria toxoid and sheep RBC. Diseased mice failed to develop antibodies to influenza and Coxsackie viruses. Antibody response to DPT vaccine was normal, but to diphtheria toxoid alone it was very depressed and to sheep RBC it was moderately reduced. Amnestic response to influenza virus was also depressed. (D. Pinkel)

69-109 EFFECT OF CORTISONE ON ONCOGENESIS BY MURINE SARCOMA VIRUS (MOLONEY). (E.) Shachat, D. A. (NCI, Bethesda, Md.), A. Fefer and J. B. Moloney. Cancer Res. 28(3):517-520, 1968.

The role of cortisone in viral carcinogenesis was investigated by inoc. of Moloney murine sarcoma virus into normal BALB/c and C57BL/6 weanling mice and into mice of the same strains pretreated with cortisone acetate (2.5 mg). The two strains were equally susceptible to tumor induction. Pretreatment with cortisone increased the susceptibility to oncogenesis and reduced the frequency of tumor regression in the absence of any alteration in the production of antibody to cell surface antigens. Tumors in mice treated with cortisone also contained more virus. (J. D. HARE)

69-110 A COMPARISON OF THE DISTRIBUTION OF TUMORS PRODUCED BY INTRAVENOUS INJECTION OF TYPE 12 ADENOVIRUS AND ADENO-12 TUMOR CELLS. (E.) Yohn, D. S. (Roswell Park Mem. Inst., Buffalo, N. Y.), L. Weiss and M. E. Neiders. Cancer Res. 28(3):571-576, 1968.

Tumors in newborn hamsters produced by either i.v. inoc. of 10^6 adeno-12 tumor cells or 10^8 adenovirus-12 TCD_{50} were compared. Many organs including liver, kidney, lungs and adrenals supported growth of tumors following i.v. inoc. Tumors were not distributed according to organ wt., but their distribution appeared to be influenced by anatomical and physiological factors. In contrast, tumors were produced in 100% of livers and 38% of the kidneys by adenovirus-12. These studies indicated that the liver and kidney contained particularly susceptible target cells and a favorable environment for tumor growth, while the heart and lungs, although presenting a presumably favorable environment, either contained insufficient target cells or received an insufficient virus dose. (J. D. Hare)

69-111 A MORPHOLOGIC COMPARISON OF TUMORS PRODUCED BY TYPE 12 ADENOVIRUS AND BY THE HA-12-IT LINE OF ADENO-12 TUMOR CELLS. (E.) Neiders, M. E. (Roswell Park Mem. Inst., Buffalo, N. Y.), L. Weiss and D. S. Yohn. Cancer Res. 28(3):577-584, 1968.

The morphology of tumors produced by i.v. inj. of type 12 adenovirus and the HA-12-IT line of adeno-12 tumor cells into newborn hamsters is described. About 33% of the tumors arising in the liver following virus inj. were well-differentiated adenocarcinomas. The remaining lesions caused by both virus and tumor cells were poorly differentiated carcinomas by generally accepted histological criteria. Adeno-12 T antigen immunofluorescence was demonstrated in all types of tumor. (J. D. Hare)

69-112 CHARACTERIZATION OF DEFECTIVENESS OF HUMAN ADENOVIRUSES IN GREEN MONKEY KIDNEY CELLS. (E.) Rapp, F. (Baylor U. Coll. of Med., Houston, Tex.), M. Jerkofsky and D. Vanderslice. J. Nat. Cancer Inst. 40(3):782-786, 1968.

In the absence of foreign helper viruses, human adenoviruses were defective in simian cells, but the degree of defectiveness varied with the adenovirus. Adenovirus 2 initiated an infection in simian cells, but no increase in virus titer was noted. In simian cells infected with adenovirus 7, a small amount of infectious virus was produced but the amount never exceeds the input level. Each cell in the population produced a small amount of virus. The increase in infectious virus was dependent upon DNA synthesis. The simian cells therefore appeared to be "leaky" for some human adenovirus serotypes. (E. Y. Lasfargues)

69-113 COMPARISON OF THE IN VITRO CYTOLOGY OF HAMSTER EMBRYO CELLS LINES TRANSFORMED "SPONTANEOUSLY" OR BY SV40. (E.) Diamandopoulos, G. T. (Harvard Sch. Med., Boston, Mass.). Amer. J. Path. 52(3):633-648, 1968.

SV40-transformed primary hamster cells are reportedly morphologically altered from the original cells. In order to determine whether the observed changes are inherent to the target cell or relevant to the presence of the SV40 genome, SV40-infected Syrian hamster embryo cells were compared to comparable cells transformed in vitro in the absence of SV40 and examined with the light microscope and by immunofluorescence. SV40-infected cells carried the neoantigens, while the noninfected did not, but their morphological characteristics were indistinguishable. It is concluded that morphological changes in transformed cells are determined by the host cell genome. (J. R. Tennant)

69-114 VIRAL DNA IN POLYOMA - AND SV40 - TRANSFORMED CELL LINES. (E.) Westphal, H. (Salk Inst. for Biological Studies, San Diego, Calif.) and R. Dulbecco. Proc. Nat. Acad. Sci. USA. 59(4):1158-1165, 1968.

Amounts of viral DNA present in polyoma- and SV40-transformed cell lines were determined by hybridizing cellular DNA with in vitro RNA complementary to viral DNA. Number of virus DNA equivalents/cell varied from 5-60 in different lines. The viral DNA was located in the nuclei of the cells. (A. O'C. Deeney)

69-115 IN VITRO TRANSFORMATION OF CHEMICALLY TRANSFORMED CELLS. (E.) DiPaolo, J. A. (NCI, Bethesda, Md.), A. S. Robson and R. A. Malmgren. J. Nat. Cancer Inst. 40(4):757-770, 1968.

Hamster embryonic cells became neoplastic when grown in the presence of 3-methylcholanthrene but did not show significant morphologic changes in vitro. Exposure of these transformed cells to SV40 or LLE 46 strains of adenovirus 7 induced chromosomal changes, appearance of SV40 T antigen and changes in the morphology of the tumors induced in homologous hosts. (E. Y. Lasfargues)

69-116 SHOPE FIBROMA VIRUS ASSAY BASED ON ENUMERATION OF CELLS CONTAINING INCLUSION BODIES. (E.) Hodes, M. E. (Indiana U. Medical Center, Indianapolis) and L. M. S. Chang. Seminars Hemat. 5(2):134-140, 1968.

Inclusion bodies stainable by the May-Grunwald-Giemsa and fluorescent antibody methods appeared in HeLa, human amnion and rabbit kidney cells infected with Shope fibroma virus. At 20 h. after infection the number of inclusion bodies was linearly related to the dilution of virus and the vol. of inoculum. These observations provide the basis for an assay. The inclusion-body count is fast, reproducible and more sensitive than the plaque assay; a quantitative relationship was seen between the amount of virus neutralized (measured by the inclusion-body count) and the dilution of added antibody. (P. H. Levine)

69-117 SPECIFIC INHIBITION OF VIRUS GROWTH IN CELLS TREATED WITH PHOSPHOLIPASE C. (E.) Friedman, R. M. (NIH, Bethesda, Md.) and I. Pastan. Proc. Nat. Acad. Sci. USA. 59(4):1371-1378, 1968.

Growth of SFV was inhibited in chick fibroblasts treated with highly purified phospholipase C (PC). Antiviral activity increased with actinomycin D pretreatment. PC did not decrease cell viability, inhibit cellular RNA or protein synthesis in uninfected cells, or production of interferon in virus-infected cells; about 40% of the phospholipid content was hydrolyzed. PC did not directly inactivate virus or inhibit adsorption or uncoating, but virus-specific RNA synthesis decreased. Differential effect of cell-virus function appeared dependent on cell membrane integrity. Virus growth also inhibited by treating cells with PC 2 hr. after infection, suggesting more than one locus of enzyme action on virus replication. (A. O'C. Deeney)

69-118 GENETIC AND VIRAL INFLUENCES ON MAMMARY TUMORS IN BR6 MICE. (E.) Lee, A. E. (Imperial Cancer Res. Fund, London). Brit. J. Cancer 22(1):77-82, 1968.

The incidence and type of mammary tumors in parous mice of different genetic backgrounds, with and without mammary tumor virus, was studied. The results demonstrated that virus is necessary for the development of spontaneous tumors, but the growth of transplanted tumors is influenced by genetic compatibility rather than by the presence of the virus. (G. H. Warren)

69-119 IN VITRO CULTIVATION OF MOUSE MAMMARY TUMOR VIRUS: DETECTION OF MTV PRODUCTION BY RADIOISOTOPE LABELING AND IDENTIFICATION BY IMMUNE PRECIPITATION. (E.) Cardiff, R. D. (U. of California, Berkeley), P. B. Blair and P. Nakayama. Proc. Nat. Acad. Sci. USA. 59(3):895-902, 1968.

MTX can be produced in detectable quantities in vitro; radioisotope labeling combined with immune precipitation is a rapid and convenient procedure for the detection and identification of the virus. (A. O'C. Deeney)

69-120 ELECTRON MICROSCOPY OF BOVINE PAPILLOMA AND DEER FIBROMA VIRUSES. (E.) Tajima, M. (U. of Wisconsin, Madison), D. E. Gordon and C. Olson. Amer. J. Vet. Res. 29(6):1185-1194, 1968.

Viral particles in both tumors were similar in size, morphologic features, location and possible mode of multiplication. In negatively stained preparations, the diameter with full capsids was approx. 54 mμ in bovine papilloma and 53 mμ in deer fibroma. Between 30 and 34 capsomeres were counted on the surface of the virion and approx. 16 capsomeres on the periphery. In thin sections, the av. diameter of viral particles in bovine papilloma was approx. 35 mμ and in deer fibroma, 34 mμ. Center-to-center spacing of the particles in crystalline arrays in bovine papilloma was 39 mμ and in deer fibroma, 36 mμ. The viral particles were nearly circular and had approx. 20 electron-dense dots and no distinct envelope. These findings are similar to those reported for the members of the papova group of viruses. It is suggested that deer fibroma viruses be classified in the same group as bovine papilloma virus. (B. R. Burmester)

69-121 ULTRACYTOCHEMICAL STUDIES ON ABERRANT STRUCTURES IN AVIAN VIRUS TUMOR CELLS. (E.) Heine, U. (Duke U. Medical Center, Durham, N. C.), D. Beard and J. W. Beard. Cancer Res. 28(3):585-594, 1968.

The aberrant cytoplasmic masses in avian virus tumor cells consisted of spheres resembling the nucleoids of the avian tumor viruses, interspersed with ribosome-like particles. Treatment with RNase completely removed the dense, ribosome-like bodies, leaving a moderately densely stained amorphous mass. Structures exposed to pepsin showed essentially no staining except that of the dense granules removed by RNase. This was in contrast to the relatively deeply stained residual material in the cytoplasm, which indicated either a high proportion of protein in the structures or major differences between the constitution of protein in the structures and that of the cytoplasm. The possible origin of the collections of spheres and associated ribosomes and their significance were discussed. (J. D. Hare)

69-122 STRUCTURE AND LEUKEMOGENIC ACTIVITY OF A MURINE LEUKEMIA VIRUS. (E.) De Tkaczevski, L. (Sloan-Kettering Inst. Cancer Res. New York, N. Y.), E. deHarven and C. Friend. J. Virol 2(4):365-375, 1968.

Purified Friend viruses were studied under the electron microscope, correlating the fine structure of the particles to their leukemogenicity under several experimental conditions (temperature, exposure to Tween 80, amyl acetate and ether). The results indicate that an intact viral envelope was prerequisite to leukemogenic activity. The percentage of C particles was not increased after heating for 1 hr. at 45°C. Digestion with RNase indicated the presence of RNA within the nucleoids of enveloped A particles, demonstrating that they are not immature particles. (NCI)

69-123 IMMUNOSUPPRESSIVE EFFECTS OF FRIEND AND RAUSCHER LEUKEMIA DISEASE VIRUSES ON CELLULAR AND HUMORAL ANTIBODY FORMATION. (E.) Geglowski, W. S. (Temple U., Philadelphia, Pa.) and H. Friedman. J. Nat. Cancer Inst. 40(5):983-995, 1968.

Infection of mice with Rauscher or Friend viruses interfered with antibody production on the cellular level following immunization with sheep RBC and detection by a localized hemolytic plaque assay. The number of antibody-forming cells was markedly depressed after immunization and no compensatory increase of antibody-forming cells in lymph nodes and the thymus was seen. Serum antibody suppression was not as marked as that observed on the cellular level. Virus-infected mice also showed a suppressed secondary response when sheep RBC cells were admin. 10-15 days after the primary immunization. The strongest suppression was observed in animals with marked splenomegaly. Other studies indicated a depressed immune response after infection of mice with a variety of tumor viruses or treatment with carcinogens. (NCI)

69-124 RNA POLYMERASE ACTIVITY FOLLOWING INFECTION WITH MURINE LEUKEMIA VIRUS. (E.) Lin, F. H. (Albert Einstein Med. Ctr., Philadelphia, Pa.). Biochim. Biophys. Acta 157(2):410-321, 1968.

Enzymes capable of incorporating (2-^{14}C) UMP into an acid-insoluble product were extracted from spleens of Friend virus-infected mice. Extracts from infected mice showed 8 times the RNA polymerase activity of controls. Enzyme activity was localized in the nucleus and required all four ribonucleoside triphosphates and Mn^{2+}. It was sensitive to actinomycin D and DNase. Max. enzyme activity was at pH 8.3 and 2 mM Mn^{2+}. The in vitro enzyme product was DNase-resistant and sensitive to RNase. The product of enzyme preparation from infected spleens was a heteropolymer, whereas the extract from normal spleens was primarily due to a terminal addition. The data suggest the presence of a splenic, intranuclear, DNA-dependent RNA polymerase following infection with the virus. The temporal relationships suggest a probable involvement of this enzyme in the process of viral induced leukemogenesis. (NCI)

69-125 INFLUENCE OF HOST GENOTYPE ON RESPONSES TO FOUR STRAINS OF AVIAN LEUKOSIS VIRUS. (E.) Payne, L. N. (Reg. Poultry Res. Lab., East Lansing, Mich.), L. B. Crittenden and W. Okazaki. J. Nat. Cancer Inst. 40(5):907-916, 1968.

RPL 28, RPL 29 and RPL 30 strains of avian leukosis virus were classified as subgroup A viruses, according to Vogt's A-B classification of avian leukosis/sarcoma viruses. RPL 25 was a mixture of subgroup A and B viruses. The 4 leukosis viruses were inoc. into chick embryos heterozygous or homozygous-resistant at the tva locus. This locus, which controls infectivity by subgroup A viruses, greatly influenced the oncogenic properties of RPL 28, 29 and 30; erythroblastosis, sarcomas and lymphoid leukosis were markedly suppressed. In contrast, tumor production by RPL 25 was only slightly suppressed. (NCI)

69-126 LONG-TERM PROPAGATION OF MURINE ERYTHROBLASTOSIS VIRUS IN VITRO. (E.) Somers, K. D. (U. Chicago, Ill.) and W. H. Kirsten. J. Nat. Cancer Inst. 40(5):1053-1065, 1968.

A murine erythroblastosis virus (MEV) was maintained for over 20 mo. in an erythroblastic mouse spleen cell line. MEV release was demonstrated by bioassays, electron microscopy, biophysical and immunological properties of the virus. It was transmitted to 3T3 mouse fibroblasts, where its replication was demonstrated, but the virus remained noninfectious. (NCI)

69-127 TISSUE CULTURE ASSAY OF HELPER ACTIVITY OF MURINE LEUKEMIA VIRUS FOR MURINE SARCOMA VIRUS. (E.) Fischinger, P. J. (NCI, Bethesda, Md.) and T. E. O'Connor. J. Nat. Cancer Inst. 40(6):1199-1212, 1968.

Stocks of mouse sarcoma virus (MSV) obtained from a 3T3 mouse cell line infected with MSV showed no evidence of defectiveness measurable by helper activity of a leukemia virus. This finding supports the concept of a "competent" MSV. (NCI)

69-128 SOME BIOLOGIC, IMMUNOGENIC, AND MORPHOLOGIC EFFECTS IN MICE AFTER INFECTION WITH A MURINE SARCOMA VIRUS. I. BIOLOGIC AND IMMUNOGENIC STUDIES. (E.) Law, L. W. (NCI, Bethesda, Md.), R. C. Ting and M. F. Stanton. J. Nat. Cancer Inst. 40(5):1101-1112, 1968.

Thymectomy at 3 days of age increased the frequency of murine sarcoma virus (MSV) tumors after i.m. inj. into mice. The age of susceptibility was also lengthened. At the site of inj. reactive granulation tissue was found, forming "atypical granulomas". Atypical granulomas did not grow progressively when transplanted into syngeneic hosts, but they released infectious MSV whereas neoplasms released little or no MSV. Resistance to transplantation of atypical granulomas in irradiated hosts was elicited by MSV, MLV and MSV-induced tumors releasing infectious virus. Passive resistance was conferred by anti-MSV serum. (NCI)

69-129 SOME BIOLOGIC, IMMUNOGENIC, AND MORPHOLOGIC EFFECTS IN MICE AFTER INFECTION WITH A MURINE SARCOMA VIRUS. II. MORPHOLOGIC STUDIES. (E.) Stanton, M. F. (NCI, Bethesda, Md.), L. W. Law and R. C. Ting. J. Nat. Cancer Inst. 40(5):1113-1129, 1968.

Pathological changes induced by inoc. of murine sarcoma virus or virus-induced tumor tissues were studied in 204 mice. The common lesion was inflammatory cells and granulation tissues that permeated subcutaneous tissues and muscle. This tissue contained atypical mesenchymal cells. Tumors with all morphological characteristics of either mesenchymal cell sarcomas or hemangiosarcomas seemed to evolve from a small percentage of the granulomas. (NCI)

69-130 BIOLOGICAL PROPERTIES OF B PARTICLES FROM C3H AND C3Hf MOUSE MILK. (E.) Hageman, P. C. (Netherlands Cancer Inst., Amsterdam), J. Links and P. Bentvelzen. J. Nat. Cancer Inst. 40(6):1319-1324, 1968.

B particles isolated from C3H mouse milk had a high tumorigenic acitvity in BALB/c mice. B particles from C3Hf either had very little or no activity after 300 days. A mixture of equal amounts of B particles from both sources did not decrease the tumor incidence as compared to C3H B particles alone; therefore, C3Hf B particles are not an inhibitor. A 1000-fold high conc. of C3Hf B particles added to a threshold dose of C3H B increased the tumor incidence. (NCI)

69-131 A SMALL VIRUS-LIKE PARTICLE OBSERVED IN HUMAN BREAST CANCER BY MEANS OF ELECTRON MICROSCOPY. (E.) Feller, W. F. (Georgetown U. Med. Sch., Washington, D. C.) and H. C. Chopra. J. Nat. Cancer Inst. 40(6):1359-1373, 1968.

A small virus-like particle was observed in 37% of human breast biopsies and 4/7 breast cancer pts. This particle is about 30 mμ in diameter with an electron-dense nucleoid and a double outer membrane. (NCI)

69-132 ELECTRON MICROSCOPIC STUDY OF THE MAMMARY TUMOR AGENT IN PLASMA CELL TUMORS. (E.) Dalton, A. J. (NCI, Bethesda, Md.) and M. Potter. J. Nat. Cancer Inst. 40(6):1375-1385, 1968.

Plasma cell tumors, induced in BALB/c mice and foster-nursed on C3H mothers to introduce the mammary tumor agent, showed intracytoplasmic A particles, giving further evidence for a relationship between mammary tumor virus and this type of A particle. (NCI)

69-133 PROPAGATION OF THE MAMMARY TUMOR AGENT (BITTNER VIRUS) IN THE ABSENCE OF MAMMARY GLANDS IN MICE. (E.) Dux, A. (Netherlands Cancer Inst., Amsterdam) and O. Mühlbock. J. Nat. Cancer Inst. 40(6):1309-1312, 1968.

The mammary tumor virus can multiply in the absence of the mammary gland; it can be isolated and passaged from the spleen of infected, mastectomized animals but the site of replication was not determined. (NCI)

69-134 IMMUNOLOGY OF THE MOUSE MAMMARY TUMOR VIRUS (MTV). ELECTRON MICROSCOPIC STUDIES OF INTERACTION BETWEEN MTV AND SPECIFIC ANTIBODY IN IMMUNODIFFUSION. (E.) Blair, P. B. (U. California, Berkeley), C. Smoller, R. S. Bonhag and D. W. Weiss. J. Nat. Cancer Inst. 40(6):1325-1338, 1968.

The precipitate line specific for the mouse mammary tumor virus (MTV), which develops in immunodiffusion plates, contained aggregated B particles. When ferritin-conjugated serum globulin was added to the immunodiffusion plate, ferritin granules localize around the virus particles. This experiment further identifies the B particle with MTV. (NCI)

69-135 TIME OF APPEARANCE OF VIRAL ACTIVITY IN RED BLOOD CELLS OF MICE INFECTED NATURALLY OR ARTIFICIALLY WITH MAMMARY TUMOR VIRUS. (E.) Ritter, R. I. (U. California, Berkeley) and S. Nandi. J. Nat. Cancer Inst. 40(6):1313-1317, 1968.

The mammary tumor virus activity borne by RBC of naturally and artificially infected BALB/c mice occurred in a similar time sequence in both groups of mice. (NCI)

69-136 TUMOR CONTROL BY IRRADIATION: A C3H/He MOUSE MAMMARY CARCINOMA IN MAMMARY-TUMOR-AGENT-FREE MICE. (E.) Suit, H. (U. Texas M. D. Anderson Hosp., Houston) and A. Kastelan. J. Nat. Cancer Inst. 40(5):945-950, 1968.

Tumor control assays are described for C3H/He mouse mammary carcinoma transplanted into C3H/He and agent-positive or agent-free F_1 hybrids. A very weak but demonstrable antigenicity of the tumor cells did not modify the tumor control probability after local irradiation of tumor. (NCI)

69-137 INFLUENCE OF MAMMARY TUMOR VIRUS ON THE TUMOR-PRODUCING CAPABILITIES OF NODULE OUTGROWTH FREE OF MAMMARY TUMOR VIRUS. (E.) Medina, D. (U. California, Berkeley) and K. B. DeOme. J. Nat. Cancer Inst. 40(6):1303-1308, 1968.

The mammary tumor virus (MTV) can participate in the production of neoplastic variants within a population of nodule cells. Virus-free nodules infected with MTV gave rise to more tumors than control virus-free nodules. (NCI)

69-138 ATTEMPTS TO RELATE BOVINE PAPILLOMA VIRUS TO THE CAUSE OF EQUINE SARCOID: IMMUNITY TO BOVINE PAPILLOMA VIRUS. (E.) Ragland, W. L. (Washington State U., Pullman) and G. R. Spencer. Amer. J. Vet. Res. 29(7):1363-1366, 1968.

Sera from 9 horses with equine sarcoid were tested for the presence of neutralizing antibodies to bovine papilloma (BP) virus. There was no significant neutralization of BP virus by the sera under conditions in which serum from horses immune to BP virus did neutralize. Four other horses with equine sarcoid developed fibroblastic tumors of the dermis when inoc. intradermally with BP virus. The response in these 4 horses was indistinguishable from that produced in normal horses by BP virus. This evidence failed to support the view that equine sarcoid is caused by BP virus. (NCI)

69-139 REPLICATION OF DEFECTIVE SIMIAN VIRUS 40 AND A MONKEY CELL-ADAPTING COMPONENT IN HUMAN KIDNEY CELLS. (E.) Butel, J. S. (Baylor Univ. Coll. Med., Houston, Tex.) and F. Rapp. J. Virol. 2(5):541-542, 1968.

Growth cycle studies of simian virus 40 (SV40), PARA-adenovirus 7, and MAC-adenovirus 7 were observed in human embryonic kidney (HEK) cells. Titers of complete SV40 48-72 hr. after infection generally did not exceed input levels. In contrast, PARA and MAC replicated well in HEK in the presence of helper adenovirus, reaching max. titers at 24-48 hr. after infection. Adenovirus from cultures infected with PARA-adenovirus reached max. titers at 48 hr. The difference in the abilities of complete and defective SV40 to multiply in HEK is attributed to adsorption characteristics, since defective PARA and MAC genomes are encased in adenovirus capsids. After incub. at 37°C for 2 hr., about 70% of inoc. SV40 could be recovered in the extracellular fluid, whereas 10% of PARA-7 adenovirus remained unattached to HEK cells. (NCI)

69-140 MECHANISM OF ENHANCEMENT OF VIRUS PLAQUES BY CATIONIC POLYMERS. (E.) Wallis, C. (Baylor Univ. Coll. Med., Houston, Tex.) and J. L. Melnick. J. Virol. 2(4):267-274, 1968.

Viruses enhanced by cationic polymers (CP), diethylaminoethyl-dextran and protamine were not inhibited by polyanions in agar. Enhancement of adenovirus (SV15) by protamine appeared to be due to this substance serving as a source of arginine required by the cultured cells. Other viruses (such as herpes and echovirus types 3,4,5, and 6), susceptible to agar inhibitors, were enhanced by CP, even under starch gel and methylcellulose overlays free of polyanions. It is believed that CP increases the diffusion of virus through gels. Plaque enhancement is the result of the gel becoming positively charged so that viruses move effectively through them. (NCI)

69-141 HYBRID OF MONKEY AND HUMAN ADENOVIRUSES. (E.) Alstein, A. D. (L. A. Tarassevich State Control Inst. Med. Biol. Preparations, Moscow), N. N. Dodonova, N. N. Vassilyeva and E. M. Tsetlin. J. Virol. 2(5):488-493, 1968.

Infection of green monkey kidney (GMK) cells with C8 strain monkey SA7 adenovirus and human adenovirus type 2 resulted in a hybrid virus, designated Ad2C8. Preparations of the hybrid virus contained 2 types of viral particles: human adenovirus type 2 and hybrid particles. The hybrid virus multiplied in GMK cells in the presence of human adenovirus types 1,2 and 5, but not 3 and 7. Ad2C8 serves as a helper for human adenoviruses, induces T antigen of the C8 virus but does not induce tumors in hamsters. (NCI)

69-142 ADENOVIRUS TRANSFORMATION OF HAMSTER EMBRYO CELLS. (E.) Casto, B. C. (Education Res. Found., Chicago, Ill.). J. Virol. 2(4):376-383, 1968.

Foci of morphologically transformed cells developed within 12 days after inoc. of hamster embryo cells with human adenovirus type 12 (Ad12) or simian adenovirus (SA7). Dose-response studies showed linearity of focus formation with dilution of Ad12 or SA7. Ratios of PFU:FFU were 1.8×10^6 for Ad12 and 2.6×10^5 for SA7. Most of Ad12 involved in transformation was adsorbed by 3 hr. Cell lines derived from SA7-transformed cells produced tumors within 19 days when inoc. intradermally into young adult hamsters. These tumors histologically resembled SA7 virus-induced hamster tumors. Immunization of test animals with SA7 or Ad12 inhibited formation of tumors by SA7 transformed cells. (NCI)

69-143 ROLE OF ADENOVIRUS STRUCTURAL PROTEINS IN THE CESSATION OF HOST-CELL BIOSYNTHETIC FUNCTIONS. (E.) Levine, A. J. (U. Pennsylvania Sch. Med., Philadelphia) and H. S. Ginsberg. J. Virol. 2(5):430-439, 1968.

Fiber (F) and hexon (H) capsid proteins from adenovirus 5 were bound to DNA from KB cells or the virus. This association was reversible and independent of whether the DNA was native or denatured. At 0.01 M NaCl max. binding occurred; raising the ionic strength to 0.2 M caused a decrease in the union. The pH range for binding of F was 6.3-8.4. A small decrease was observed for H DNA below pH 7.5. DNA-dependent RNA polymerase (I) and DNA polymerase (II) from KB cells was inhibited by F to a greater extent than H. Increasing the template DNA conc. decreased the inhibition. Inhibition of I by F or H was reversed by increasing the ionic strength. For 15-20 hr. after infection, I and II remained unchanged. By 30 hr., their activities were 30% of the enzyme activities in control cells. (NCI)

69-144 MENGOVIRUS REPLICATION IN NOVIKOFF RAT HEPATOMA AND MOUSE L CELLS: EFFECTS ON SYNTHESIS OF HOST-CELL MACROMOLECULES AND VIRUS-SPECIFIC SYNTHESIS OF RIBONUCLEIC ACID. (E.) Plagemann, P. G. W. (U. Minnesota Sch. Med., Minneapolis). J. Virol. 2(5):461-473, 1968.

In Novikoff cells, strain N1S1-67 (I) and mouse L cells, L67 mutant (II) infected with mengovirus under identical conditions, after 2 hr., viral RNA (V-RNA) displaced systhesis of cellular RNA (C-RNA). Although the growth rate of uninfected I was 3-fold that of II, synthesis of single- and double-stranded V-RNA and virus production were quite similar in both types of cells. In I and II, V-RNA synthesis coincided with induction of V-RNA polymerase. Protein synthesis by I and II proceeded at the same rate as in uninfected cells until 3 hr. after infection; disintegration of polyribosomes was seen toward the end of the replicative cycle (5-6 hr.). Virus was released more slowly by II than by I. Treatment of I and II with actinomycin D prior to infection markedly inhibited virus production in I. (NCI)

69-145 LACK OF ONCOGENIC POTENTIAL OF MEASLES VIRUS ON SYRIAN HAMSTER EMBRYO CELL CULTURES. (E.) Diamandopoulos, G. T. (Harvard Med. Sch., Boston, Mass.). J. Virol. 2(5):543-544, 1968.

Syrian hamster embryo cell cultures were infected with measles virus (Edmonston strain) (V) and cell suspensions (10^6 cells) of treated and control lines were tested for oncogenicity in cheek pouches of weanling Syrian hamsters. As late as 10 mo. after inoc., no tumors appeared, but 1 line became oncogenic in 2/6 animals at 15 mo. and in 6/6 animals at 20 mo. Another infected line produced tumors in 3/6 animals at 20 mo. One of the control lines became oncogenic in 6/6 animals at 25 mo. Such delayed transformation was concluded to be "spontaneous" in character and that V was not etiologically related to such changes for the following reasons: from previous experience with oncogenic viruses, neoplastic transformation occurred as early as 1-2 mo.; and neither V nor measles-related cellular antigens were demonstrated in the tumors or the tumor cells *in vitro*. (NCI)

See also abstract nos.: 19,157,163,173,179,187,204

69-146 STUDY OF GENERAL MORBIDITY OF THE RURAL POPULATION OF HUNGARY. (Fr.) Fülöp, T. (U. Debrecen, Hungary) and G. Mányi. Sante Publique (Bicur.) 8(2):171-178, 1967.

The total morbidity, as reported by physicians consulted, in the Hungarian towns of Tetétlen (population 2204; 1069 males, 1135 females), Balmazujváros (population 5309; 2574 males, 2735 females) and Nádudvar (population 10,395; 5137 males, 5258 females) in 1962, 1964 and 1962, resp., was 2093.1, 2306.2 and 1766.4/1000 population, resp. (1905, 2081 and 1504, resp., in males; 2268, 2491 and 2021, resp., in females). The incidence of malignant tumors was 16.8, 8.3 and 8.6/1000, resp. (8, 7 and 5, resp., in males; 25, 12 and 10, resp., in females).

69-147 MASS CERVICAL CANCER SCREENING PROGRAM BY IRRIGATION SMEAR IN JAPAN. (E.) Kawashima, Y. (Aichi Cancer Ctr. Hosp., Nagoya, Japan), S. Ino, K. Tashiro, M. Tachibana and T. Masukawa. Obst. Gynec. 32(1):17-23, 1968.

A method of examination with 95% accuracy when performed by the pts. is described. Cervical smears were obtained from 5452 women over 30 (64% of the total female population over 30) from a rural district of Aichi Prefecture (central Japan). Class III-V smears were seen in 128 women (2.3% of the group). Follow-up studies of 122 pts. demonstrated carcinoma in situ in 5 pts. and invasive squamous cell carcinoma in 3 pts. (total 1.5/1000). The diagnostic accuracy of this method was 86% for carcinoma in situ and 100% for invasive carcinoma.

69-148 PLASMACYTOMA OF THE UPPER RESPIRATORY TRACT. (E.) Nabar, B. V. (Roy. Infirmary, Aberdeen, Scotland). J. Laryng. Otol. 82(7):657-664, 1968.

In a fairly stable population, the incidence of upper respiratory plasmacytoma in 1956-1966 was 1:99,000 in the area of Aberdeen.

69-149 THE INCIDENCE OF GASTROINTESTINAL CANCER IN VENEZUELA. (Sp.) Beker, S. (Central U. Venezuela), M. de Gonzalez, G. Peraza and J. Valencia-Parparcen. G.E.N. 22(3):207-208, 1968.

In 1960, 1961 and 1964, the total tumor mortality rate in Venezuela was 74.4, 73.7 and 76.5/100,000 population, resp. (compared to 149.4/100,000 in the U.S. in 1961). From 1960 through 1964, 21,142 pts. died of malignant disease, 42.7% (9045 pts.) of which involved the g.i. tract. During this time, 4083 tumors were identified pathologically at the University of Caracas, including 758 g.i. tumors (18.5% of the group). The most frequent sites were stomach (53.8%) and liver + biliary tract (11%), followed by colon, esophagus, pancreas, anorectal and small intestine cancer, in decreasing order. Except for the anorectal tumors, the morbidity rates from this hospital's records were about the same as in the whole of Venezuela. Most tumors developed in pts. over 50 (who comprised about 9.8% of the total population in 1961); stomach cancer was more frequent in men than in women.

69-150 GESTATIONAL CHORIOCARCINOMA IN THE GENERAL HOSPITAL OF MEXICO: ANALYSIS OF FORTY CASES. (E.) Márquez-Monter, H. (Gen. Hosp., Mexico City), G. A. De La Vega, C. Ridaura and M. Robles. Cancer 22(1):91-98, 1968.

Pregnancy complications in 50,727 maternity ward cases seen in 1961-1965 included 234 cases of hydatidiform mole (0.46%), 18 of choriocarcinoma (0.03%) and 6 of chorioadenoma destruens; choriocarcinoma accounted for 0.5% of all tumors and 2% of all female genital tumors seen at autopsy. In 40 pts. with choriocarcinoma, the av. age was 30 yr. (range 21-58); 20/27 evaluable pts. had histories of multiple pregnancies. Two pts. were 6-11 yr. postmenopausal at the onset of symptoms. The pts. seen at the General Hospital of Mexico City represent a population of poor environmental and socioeconomic conditions, high illiteracy and little or no health education.

69-151 FREQUENCY AND REGIONAL DIFFERENCES IN FEMALE GENITAL CARCINOMA IN AFRICA. (Ger.) Huber, A. Med. Klin. 63(29):1136-1137, 1968.

Tumor frequency was studied in 11,052 women from 10 African nations. The incidence of ovarian cancer was higher in the Congo, Nigeria and the former French West Africa (FWA; 18.8-23.8%) than in Egypt (0%), Ethiopia, Mozambique, South Africa, the Sudan and former British East Africa (BEA) (5-15.6%), but this may reflect a higher accuracy in diagnosis. The incidence of vulva and vagina cancer was 1.3% in Ethiopia, 5-8% in the Congo and Nigeria, 14% in Mozambique and about 4% (equivalent to the av. in Europe) in the other nations. The breast cancer incidence was 42-43% in the Sudan and FWA and 15-27% in the other nations except Nigeria and Egypt (both 0%), compared to 50-60% in Europe. Marked regional differences were seen in the frequency of uterine cancer (1.4-3% in South Africa, Ethiopia, the Congo, Nigeria and FWA; 4-7.5% in the Sudan, BEA and Mozambique, 31.3% in Libya, 90.6% in Egypt) and cervix cancer (9.4% in Egypt, 22-30% in Libya, FWA and the Sudan, 40-55% in Nigeria, BEA and the Congo, 60-67% in

Ethiopia, Mozambique and South Africa). The ratio of corpus:cervical cancer was 1:4 in the Sudan, compared to 1:4-6 in Europe; it was markedly increased in Egypt and Libya (1:0.1 and 1:0.7, resp.) and significantly reduced in BEA (1:9.8), FWA (1:11.3), Mozambique (1:15.2) and South Africa (1:44.7). The reduced frequency of cervical cancer was attributed to the custom of circumcision in the Moslem nations.

69-152 DEATHS FROM CHILDHOOD CANCER IN SIBS. (E.) Miller, R. W. (NCI, Bethesda, Md.) New Eng. J. Med. 279(3):122-126, 1968.

Examination of death certificates of 21,659 children (age <15 yr.) who died of malignant disease in the U.S. in 1960-1964 revealed 26 families with 2 siblings (never 3 or more) who died of cancer in this period. The 5 sets of twins were all like-sex pairs who died of leukemia before the age of 6 yr., within a short time of each other; this incidence (3.58/10^5 population at risk) was significantly higher than expected. Five other pairs of siblings other than twins died of leukemia (this incidence was not elevated); there were no cases of leukemia in 1 child and a different tumor in another (4 were expected). One pair each died of lymphoma, Wilms' tumor and osteogenic sarcoma and 1 sib pair of reticulum cell sarcoma (1/2) and a salivary gland sarcoma (1/2). The incidence of brain tumors in 2 sibs (6 cases; 0.4 expected) was significantly increased. There were 6 cases of sibling pairs in which 1 child had a brain tumor and the other had a primary bone or soft tissue tumor (2.0 expected); 3/6 pairs had positive family histories of cancer and 1 pair had tuberous sclerosis.

69-153 NEOPLASMS INVOLVING THE SPINAL CORD: AN ANALYSIS OF 85 CONSECUTIVE CASES. (E.) Haerer, A. F. (U. Mississippi Med. Ctr., Jackson) and R. R. Smith. Southern Med. J. 61(8):801-807, 1968.

The histories of 85 adults and children undergoing laminectomy for spinal tumors in 1961-1967 were reviewed. Most of the pts. were male (68/85), but the hospital population was predominantly male; 56% of the pts. were white and 44% were Negro, about the same distribution as in the state of Mississippi. The incidence of metastatic tumors (66/85 = 78%) in this group was much higher than that reported in other groups; primary tumors were slightly more frequent in white pts. than in Negroes (63% of the 19 pts. were white). The increased incidence of metastatic tumors was attributed to an increase in the incidence of tumors metastasizing to the spinal cord, particularly lung cancer.

69-154 INGUINAL HERNIA AND COLON CARCINOMA. (E.) Davis, W. C. (U. Nebraska Coll. Med., Omaha) and F. C. Jackson. CA 18(3):143-145, 1968.

Data for 2 groups of men in Pittsburgh (280 pts.) and Omaha (23 pts.) admitted with colon cancer from 1955-1966 are discussed. Most of these pts. (76.5% and 88%, resp.) were over 55 yr. old. The sites of the tumors were about the same as reported in other groups: rectosigmoid in 60.1% and 60.8%, resp.; descending colon in 6.4% and 17.4%, resp.; cecum in 13.6% and 8.7%, resp.; ascending colon in 8.1% and 8.7%, resp.; splenic flexure in 3.2% and 4.4%, resp.; hepatic flexure in 3.6% and 0%, resp.; anus 1.1% and 0%, resp.; and transverse colon in 3.9% and 0%, resp., of the pts. studied in Pittsburgh and Omaha. Inguinal hernias were present at admission or had been repaired within the preceding 2 yr. in 21% (59/280) of the Pittsburgh group and 39% (9/23) of the Omaha group; 6/23 of the latter group had been admitted for treatment of the hernia and showed no symptoms referable to colon cancer. The incidence of inguinal hernia in these pts. was about 3-fold higher than the frequency in the total male population in the 65-74 yr. age group. It is concluded that pts. with inguinal hernias of recent origin, recurrence or symptomatology should be examined for large intestine cancer, and that all pts. over 55 should undergo sigmoidoscopy and barium enema examination before elective hernia repair.

69-155 THE THEORY OF CYCLIC VARIATIONS IN THE OCCURRENCE OF TUMORS DERIVED FROM THE GLIA. (Pol.) Szydlowska, H. and E. Szwagrzyk. Folia Med. Cracow 10(2):249-259, 1968.

No significant cyclic variations in the yearly incidence of gliomas/100 operated brain tumors (total numbers not stated) were found in the 1946-1966 records of the Neurosurgical Clinic of the Medical Academy in Cracow. This contradicts the viral theory of glioma etiology. The data was subdivided according tumor type (astrocytoma, glioblastoma multiforme, oligodendroglioma, glioma mixtum). The index of gliomas/yr./100 operated tumors was 50-60%. The frequency of different groups of glial tumors/100 gliomas operated/yr. showed some fluctuations, which corresponded only to the character of the disease and its malignancy but not to cyclic changes of intensity. The 1946-1956 records showed a preponderance of astrocytomas, with the exception of 1952 when there was a preponderance of glioblastoma multiforme. In 1957-1960, glioblastoma multiforme was more prevalent in spite of the appearance of oligodendroglioma and glioma mixtum. In 1961-1966 there was again a preponderance of well differentiated glia tumors such as astrocytoma.

69-156 PREVALENCE OF MALIGNANT NEOPLASMS OF THE BREAST IN POLAND (1962-1964) AND IN SELECTED AREAS (1962-1965). (Pol.) Koszarowski, T. (Oncol. Inst., Warsaw), H. Gadomska, B. Warda and Z. Drozdzewska. Pol. Tyg. Lek. 23(25): 933-934, 1968.

An analysis of reported neoplasms among women in all of Poland (total number not stated) in 1964 showed the following distribution: stomach 11.5%, liver and bile ducts 6.5%, breast 12.6%, cervix 24.4% and skin 6.9%. The av. incidence of breast cancer, 100,000 women, remained at 16 between 1962-1964. The incidence rose with age, from 13.9/100,000 for the 35-39 age bracket to 51.1/100,000 in women 65 or older. Histological verification was obtained in 53.8% of cases. Analysis of data from the city of Warsaw showed the following distribution of neoplasms: stomach 10%, liver and bile ducts 10.5%, breast 13.5%, cervix 18.5% and ovary 5.8%. The incidence of breast cancer was 38.9/100,000 ranging from 19.1 at age 35-39 to 104.5 at age 65 and over. Histological examinations were performed in 40.1% of cases. In selected rural areas (Minsk Mazowiecki and Siedlce), the distribution of reported neoplasms was stomach 12%, liver and bile ducts 7.2%, breast 13.2%, cervix 12.6% and uterus 6%. The incidence of breast cancer was 15.6/100,000. Histological examinations were performed in 51.4% of cases. Breast cancer was the second most frequent type of cancer among women in Poland, accounting for 12.8% of all neoplasms. The reasons for the 2.5-fold greater incidence of breast cancer among women in cities (av. 38.9/100,000) than in rural areas (av. 15.6/100,000) could not be determined.

69-157 A STUDY OF 143 CASES OF LEUKEMIAS WITH EXPERIMENTAL WORK IN PRODUCTION OF LEUKEMIA IN MICE. (E.) Reddy, D. B. (Med. Coll., Guntur, India), B. M. Saran and P. Volgadevi. J. Indian Med. Prof. 14(2):6087-6095, 1967.

From 1960-1966, 143 pts. (including 4 children under 10 and 36 pts. age 11-20) with acute lymphatic leukemia (ALL; 28/143), chronic myeloid leukemia (CML; 82/143), acute myeloid leukemia (AML; 21/143), chronic lymphatic leukemia (CLL; 10/143) and aleukemic lymphatic leukemia (1/143) were seen at the General Hospital of Guntur, India. The total incidence was 0.44% of hospital admissions (total 36,196), increasing steadily from 0.21% in 1960. CML was seen in 50% of adults between 21-40 yr. old. The male:female ratio was 86:57. No histories of exposure to leukemogenic chemicals were obtained. Associated diseases included chloroma of the eye (1 pt. with AML), reticulum cell sarcoma (1 pt. with CLL) and lymphosarcoma (1 pt. with CML). Cell-free filtrates from 4/7 pts. with ALL (1/2), AGL (1/2) and CLL (2/3) induced marked lymphocytosis and lymphocytic infiltration of the heart and lungs in mice after i.p. inoc.

69-158 A PROSPECTIVE STUDY OF MORTALITY OF SEVERAL OCCUPATIONAL GROUPS: SPECIAL EMPHASIS ON LUNG CANCER. (E.) Dunn, J. E., Jr. (California State Health Dept., Berkeley) and J. M. Weir. Arch. Environ. Health (Chicago) 17(1):71-76, 1968.

A questionnaire survey of union members from 1954-1957 yielded data from 68,153 men (age 35-64 yr.; data collection was stopped when informants reached 70 yr.) totaling 482,658 person-yr. of observation. The subjects were matched by age, duration of occupation and smoking habits. In the 5-yr. period, 4706 deaths were recorded; causes of death included malignant disease in 707/4706 (368 from lung cancer), emphysema in 58/4706, coronary heart disease in 1718/4706, hypertension in 101/4706 and liver cirrhosis in 198/4706. The only 2 groups showing an excess mortality from oral cancer (marine engineers or firemen and culinary workers not including cooks) were also the only 2 groups with excess mortality from liver cirrhosis. No significant variation from expected lung cancer mortality rates was noted in 12/14 occupational groups, including plumbers and boilermakers exposed to asbestos. A low mortality rate among printers (13 observed/26 expected deaths/34,788 person-yr.) was apparently due to chance; 17 additional deaths from lung cancer were observed in the next 2.5 yr. A highly significant increase in lung cancer mortality (10 observed/3.02 expected/3830 person-yr.) was seen in asbestos workers. The lung cancer mortality rate, corrected for age and smoking habits, was 1.4 after 1-11 yr. of exposure, 2.5 after 12-22 yr. and 4.7 after 23-33 yr. of exposure (taking all other rates combined as 1.0).

69-159 SOUTH LONDON LUNG CANCER STUDY. (E.) Nash, F. A., J. M. Morgan and J. G. Tomkins. Brit. Med. J. 2(5607):715-721, 1968.

Serial routine chest X-rays were obtained for 67,400 men over 45 (of whom 12,300 lived outside the South Metropolitan Cancer Registry area) between January, 1959 and June, 1965. Repeat examinations were performed 197,500 times (>80% were performed 32 wk. or less after the first examination). Primary lung cancer was noted in 147/197,500 repeat examinations; the incidence was 1.0/1000 in cigarette smokers (111/112,913 X-rays), 0.7 in pipe smokers (13/18,932), 0.5 in pipe and cigarette smokers (3/6041) and 0.3 (16/53,944) in nonsmokers; the incidence increased with age and the number of cigarette smoked. The av. time from diagnosis to lobectomy was 13 wk. (range 1 wk.-2.5 yr.); 83/147 (56%) underwent resection for adenocarcinoma (15/18), squamous cell carcinoma (46/61) or undifferentiated, oat cell or anaplastic carcinoma (19/44). The 4-yr. survival rate in these pts. was 40/147 (27%); the older pts. had a higher survival rate than pts. age 45-54 at diagnosis. It is concluded that routine X-ray examination of men over 55 smoking 15 cigarettes/day at intervals of 6 mo. or less can improve the prognosis and 4-yr. survival rate by early detection of lung cancer.

69-160 SKIN TUMORS IN SOUTH FLORIDA. (E.)

Ioannides, G. (U. Miami Sch. Med., Fla.). Southern Med. J. 61(7):728-731, 1968.

Of the 2354 new cases of skin tumors reported to the author's laboratory from southern Florida in 1966, 944 were benign tumors (including 334 pigmented nevi and 264 seborrheic keratoses); no statistical data could be collected for this group, since only those pts. undergoing surgery or biopsy were reported. The 341 pts. with premalignant tumors included 303 pts. (54% were male) with actinic keratoses, 32 pts. (44% male) with Bowen's disease and 6 males with leukoplakia. Most of the lesions of actinic keratosis and Bowen's disease were on the head and neck (68% and 55%, resp.), as were 5/6 lesions of leukoplakia; 22% of the actinic keratoses were on the arms and hands. Histological types of the 1062 malignant tumors were basal and squamous cell carcinoma (82.4% and 14.1%, resp.), melanoma (2%) and other types including metastases (1.5%); most of the basal and squamous cell carcinomas and melanomas were on the head and neck (80%, 51% and 9/21, resp.) or arms and hands (6%, 25% and 7/21, resp.). Nearly all of the pts. with malignant and premalignant skin tumors were white and most were >40 yr. old. Relationships between skin tumors and exposure to the sun are discussed.

69-161 THE INCIDENCE OF APPENDECTOMIES, TONSILLECTOMIES AND ADENOIDECTOMIES IN CANCER PATIENTS. (E.)

Robinson, E. (Hadassah U. Hosp., Jerusalem). Brit. J. Cancer 22(2):250-252, 1968.

The surgical histories of 435 cancer pts. (172 male, 263 female) and 1690 normal subjects (1069 male, 621 female), inhabitants of Jerusalem, were compared. The incidence of appendectomy was significantly higher in cancer pts. than in controls (14.3% and 9.8%, resp.) and in female than in male cancer pts. (16% and 11.6% resp.); no significant sex difference was seen in controls (9.2% and 10.2%, resp.). The incidence of appendectomy was also significantly higher in Ashkenazi Jews (of European or American ancestry or origin) than in Oriental Jews (of Asian or North African origin) in both cancer pts. and control subjects, but a sex difference (not statistically evaluable because of the small number of cases) was noted only in cancer pts. With respect to tonsillectomy and adenoidectomy, the only difference was between ethnic groups; differences between cancer pts. and controls were small. Possible relationships between the higher incidence of both appendectomy and malignant tumors in Ashkenazi Jews are discussed, but no conclusions could be reached.

69-162 THE SEX RATIO IN GASTRIC CANCER AND HYPOTHETICAL CONSIDERATIONS RELATIVE TO AETIOLOGY. (E.)

Griffith, G. W. (Alexander Fleming House, London). Brit. J. Cancer 22(2):163-172, 1968.

Mortality rates from stomach cancer in 1958-63 in 24 nations were tabulated by age and sex. The male:female ration increased with age in the younger pts., from approx. 1.0 at age 25-29 to a max. of 2.23 at age 55-59, then fell progressively to 1.46 at age 80-84. This trend was noted in all nations; for example, the curve of the sex ratio by age was similar in statistics from Japan, West Germany, England and Wales and the U. S. (white) (numbers 1, 5, 17 and 25, resp., in incidence). The relationship was also seen in nations where the mortality rate declined sharply (U. S.) or gradually (Germany, England and Wales) or remained stationary (Japan). The variation of the sex ratio in mortality could not be explained as a sex difference in survival rates. This pattern was not noted in data concerning cancer of other portions of the g.i. tract. Available data suggesting that the sex ratio of total calorie consumption may fit this pattern are discussed, with particular reference to the consumption of carbohydrate foods such as potatoes.

69-16 HEMATOLOGICAL MALIGNANCIES IN PATIENTS AND THEIR PETS. (E.)

Viola, M. V. (Nat. Commun. Dis. Ctr., Bethesda, Md.). J.A.M.A. 205(8):567-568, 1968.

Two children with acute lymphoblastic leukemia and 4 adults with acute or chronic myeloid leukemia, lymphosarcoma or reticulum cell sarcoma (1/4 each) are described. Pets belonging to these pts. (1 cat, 5 dogs) developed lymphosarcoma (5/6) or myeloma (1/6) from 5 mo.-3 yr. after diagnosis of the disease in their masters (5/6) or 14 mo. prior to that time (1/6). No virus particles were demonstrated in the sera or organs of the cat and 3/3 dogs examined, although virus-like particles were seen in the plasma of 1 of the children and the pt. with chronic lymphatic leukemia. One of the canine tumors showed a "starry-sky" histology. Although the possibility of disease transmission between the pts. and their pets could not be excluded, the association was believed to be fortuitous.

69-164 AN ISLAND-WIDE SCREENING PROGRAM FOR CERVICAL NEOPLASIA IN BARBADOS. (E.)

Vaillant, H. W. (Queen Elizabeth Gen. Hosp., Bridgetown, Barbados, W.I.), G. T. M. Cummins and R. M. Richart. Amer. J. Obstet. Gynec. 101(7):943-946, 1968.

In the first 7 mo. of a mass screening program for women of reproductive age (<4% of the 5000 subjects were over 50), invasive cervical carcinoma was detected in 0.5% of the group, carcinoma *in situ* in 0.8%, mild dysplasia in 2.8% and moderate to severe dysplasia in 1.4%. The total incidence of cervical carcinoma and dysplasia (5.5%) was unusually high, even in this group of reproductive age, but was in agreement with the mortality rate from cervix cancer at all ages in Barbados over a 10-yr. period (about 4% of the total mortality rate in women). The prevalence data may therefore be applicable to the whole female population of Barbados. The subjects screened represented about 16% of the women in this age group. The elevated incidence of cervical dysplasia and carcinoma was attributed to the high frequency of reproductive events (early cohabitation, early and frequent pregnancies, multiple sexual partners) and low socioeconomic status in majority of the population. In a smaller screening program of 2600 women in a family planning program in Trinidad, the prevalence rates of cervical dysplasia or carcinoma in situ were 4.4% and 0.8%, resp.

69-165 CARCINOMA OF THE CERVIX UTERI: AN EPIDEMIOLOGICAL STUDY. (E.) Lakhanpal, U. (Med. Coll., Rohtak, India) and T. D. Chablani. J. Indian Med. Ass. 50(8):358-364, 1968.

Histories of 200 women with cervix carcinoma and 200 age-matched controls with non-malignant diseases were compared. All pts. in both groups were married and no socioeconomic differences were noted. Factors with significant association to cancer of the cervix included early and prolonged cohabitation, frequency of coitus, inadequate postpartum treatment, abortion (especially septic abortion), inadequate treatment of chronic cervicitis, lack of menstrual hygiene and the use of nonsterile intravaginal devices. Neither the age at first cohabitation nor the number of children was alone associated with cervix cancer, but both factors combined seemed to interact to produce a significant association.

69-166 A 10-YEAR SURVEY OF CERVICAL CARCINOMA IN INDIANS OF THE SOUTHWEST. (E.) Bivens, M. D. (Lovelace Clin. Albuquerque, New Mexico) and H. O. Fleetwood. Obstet. Gynec. 32(1): 11-16, 1968.

Cervical carcinoma was demonstrated in 166/46,907 Navajo Indian women admitted to reservation and neighboring hospitals over a 10-yr. period (1957-1966); 127/166 carcinomas were invasive. This incidence (3.53/1000 admissions) probably did not reflect the true incidence, since the av. age was low (mean 42.2 yr.; most Papanicolaou smears were taken in prenatal clinics). The age range was 21-85 in 1961-1966. Over the same 10-yr. period, carcinoma of the cervix was noted in 55/13,922 non-Indian women, (frequency 4.25/1000 admissions), mostly Spanish-American and Negro women of low socioeconomic status. It is concluded that although Indian women of the Southwest have a low educational and socioeconomic level, marry young and have many children, the incidence of cervical carcinoma in these women is similar to that of other American women.

69-167 RELATION BETWEEN CANCER AND CONGENITAL DEFECTS: AN EPIDEMIOLOGIC EVALUATION. (E.) Miller, R. W. (NCI, Bethesda, Md.). J. Nat. Cancer Inst. 40(5):1079-1085, 1968.

The relationship(s) between malignant diseases in children (especially children under 5) and congenital diseases is discussed on the basis of a literature survey (46 references) and statistical evaluation of death certificates (number not stated). The excess frequency of leukemia in Down's or Bloom's syndrome, Fanconi's anemia, treated polycythemia vera, identical twins or histories of high-dose radiation exposure is attributed to 1 or more peculiar genetic and/or chromosomal features. Wilms' tumor, primary liver cancer and adrenocortical tumors are associated with congenital hemihypertrophy, the visceral cytomegaly syndrome and hamartoma; Wilms' tumor is also associated with congenital aniridia, independent of hemihypertrophy. Neuroblastoma is not associated in excess with any congenital defect. Tumors without peaks in children under 5 were sometimes associated with congenital defects, such as gonadoblastoma in pts. with gonadal dysgenesis or lymphoma in pts. with inherited disorders of immunity. The increased mortality from Hodgkin's disease after age 11 may be related to the involution of lymphatic tissue at age 7. The increased frequency of bone sarcoma in post-adolescent boys, compared to girls of the same age, suggests a relationship to bone growth rates. Among the brain tumors, ependymoma and medulloblastoma (with peaks in children under 5) and glioma (which has a constant incidence at age 1-11) may be associated with genetic hamartomatous syndromes, malignant tumors of a second primary site, genetic immunity disorders and congenital and/or familial defects of the central nervous system.

69-168 PRIMARY CARCINOMA OF THE LIVER IN CHILDHOOD: AN EPIDEMIOLOGIC STUDY. (E.) Fraumeni, J. F., Jr. (NCI, Bethesda, Md.), R. W. Miller and J. A. Hill J. Nat. Cancer Inst. 40(5):1087-1099, 1968.

Statistical evaluation of 22,000 death certificates of children under 15 who died of cancer in the U. S. in 1960-1964 revealed 303 deaths from liver tumors; 282 died of primary liver carcinoma and 21 of other tumors. Hospital records for 29/282 of these pts. and 57 other children with liver carcinoma were also studied. Of these pts., 252 were white, 27 Negro, 2 Oriental and 1 Indian-Filipino (the white preponderance may reflect a higher accuracy of diagnosis); 57% of the deaths were in children under 3 and the white:nonwhite ratio was more than 4-fold higher in children under 5 than in the older pts. The male:female ratio at all ages was 1.3:1.0. Morbidity in the hospital series fell markedly after age 12 mo. Neonatal liver carcinoma was identified in 10/282 death certificates (frequency 0.48:1,000,000 live births in the U. S. 1960-1964) and 1 of the hospital records. No significant seasonal variations were noted. In the children under 5, the standardized mortality ratio (age- and color-standardized mortality rate, expressed as percentage of the av. U. S. experience) was significantly increased in the East and West North Central areas and significantly reduced in the West South Central and Pacific areas. No significant geographical variation was noted in the older group. No significant aggregation was noted by time-space cluster analysis. No siblings were included in this group and no cancer was reported among the siblings of pts. in the hospital series. One sibship of hepatoma following cirrhosis, hepatic cholestasis of unknown cause, meningitis and congenital agammaglobulinemia was noted; 3 family histories of cancer were also reported. Additional diseases included congenital hemihypertrophy (2), widespread hemangioma (2), Wilms' tumor (1), adrenal agenesis (1), neuroblastoma (4), tetralogy of Fallot (1), mongolism with congenital megacolon and aortic coarctation (1) and histories of liver disease (7; including von Gierke's disease in 1/7).

69-169 A HEALTH SURVEY OF PETROLEUM ASPHALT WORKERS. (E.) Baylor, C. H. (Texaco, Inc., New York, N. Y.) and N. K. Weaver. Arch Environ. Health (Chicago) 17(2):210-214, 1968.

69-170 ABO BLOOD GROUPS AND THE INCIDENCE OF GASTRIC CANCER, GASTRIC ULCER AND DUODENAL ULCER. (Pol.) Spruch, T. (1st Surg. Clin., Lublin, Poland) and E. Dacka. Pol. Tyg. Lek. 23(26):979-980, 1968.

69-171 SPONTANEOUS TUMORS IN BEAGLES. (E.) Zaldivar, R. (Argonne Nat. Lab., Ill.). Z. Krebsforsch. 71(1):7-15, 1968.

69-172 FAMILIAL FREQUENCY OF GASTROINTESTINAL CANCER. (Ger.) Berndt, H. (Inst. Cancer Res., Berlin). Deutsch. Med. Wschr. 93(29):1407-1408, 1968.

See also abstract nos.: 14,20,32,62,68,69,70

69-173 SUSCEPTIBILITY OF MAMMARY TISSUES OF DIFFERENT STRAINS OF MICE TO TUMOR DEVELOPMENT. (E.) Dux, A. (Netherlands Cancer Inst., Amsterdam) and O. Mühlbock. J. Nat. Cancer Inst. 40(6):1259-1265, 1968.

Mammary glands from 3 high-tumor strains (C3H, GR, GRz) and 2 low-tumor strains (C3Hf, C57BL) were transplanted into mastectomized F1 hybrids (including both reciprocal hybrids) of these strains; each mouse received 1 C3Hf or C3H and 1 C57BL, GR or GRz transplant. The C57BL mammary gland was more resistant to tumor development than the C3Hf mammary gland under identical conditions, in the presence or absence of the mammary tumor agent. No systemic action of genetic factors was demonstrable; the action of genetic factors determining mammary gland susceptibility to tumor development was in the mammary gland itself. The comparison of the susceptibility of GR and GRz mammary glands to that of the C3Hf and C3H strains was complicated by the presence and possible interaction of the 2 viruses, but little difference was apparent between the 2 groups.

69-174 C3H--A^{VY}--A HIGH HEPATOMA AND HIGH MAMMARY TUMOR STRAIN OF MICE. (E.) Heston, W. E. (NCI, Bethesda, Md.) and G. Vlahakis. J. Nat. Cancer Inst. 40(6):1161-1166, 1968.

All breeding and virgin C3H-A^{vy} female mice (C3H/H3J derived mice homozygous for the viable yellow mutant; descended from animals foster-nursed by C3H/H3 females) developed mammary tumors, mostly Types A or B, at age 6-7 mo. Substrain C3H-A^{vy}fB females (descended from mice foster-nursed by C57BL mice), presumably free of mammary tumor virus (MTV) but with nodule-inducing virus, showed a mammary tumor incidence of 90% in breeders and 20% in virgins at a greater age (av. 15 mo.). Hepatomas developed in nearly 100% of the C3H-A^{vy} males at age 12 mo. and in about 100% of the C3H-A^{vy}fB females by age 16 mo. Backcross experiments showed that the A^{vy} gene increased the incidence of hepatoma, reduced the av. age of hepatoma appearance and increased the number of hepatomas/individual male mouse. A similar increase in mammary tumor incidence was seen in females, with a parallel increase in body wt. in both sexes.

69-175 CULTURE OF A CELL LINE (NCLP-6) DERIVED FROM A HEPATOCARCINOMA INDUCED IN Macaca mulatta BY N-NITROSODIETHYLAMINE. (E.) Dawe, C. J. (NCI, Bethesda, Md.), J. Whang-Peng, W. D. Morgan, R. W. O'Gara and M. G. Kelly. J. Nat. Cancer Inst. 40(6):1167-1177, 1968.

The parent cell line, NCLP-6-E, has epithelium-like morphology and the cells contain alkaline phosphatase (AP) activity in cytoplasmic granules; it is subtriploid with a mode of 59 chromosomes, chromosome #20 trisomy and a large number of cells with 2 marker chromosomes (1 large metacentric, 1 small acrocentric). Variant subline NCLP-6-F, which evolved from NCLP-6-E after 26 subcultures, has a more rapid growth rate than NCLP-6-E, lacks cytoplasmic AP activity and is of fibroblastoid morphology. Monolayer cultures of NCLP-6-F progress to simple micropapillary and polypoid structures. NCLP-6-F is subtriploid with a mode of 56 chromosomes and disomic chromosome #20; the marker chromosomes are unchanged.

69-176 CELL PROLIFERATION IN HUMAN MALIGNANT LYMPHOMAS. ANALYSIS OF LABELING INDEX AND DNA CONTENT IN CELL POPULATIONS OBTAINED BY BIOPSY. (E.) Cooper, E. H. (Roy. Cancer Hosp., London), M. J. Peckham, R. E. Millard, I. M. E. Hamlin and R. Gérard-Marchant. Europ. J. Cancer 4(3):287-296, 1968.

Growth patterns were examined in biopsy specimens from 29 pts. with benign lymph node proliferation (2) or malignant lymphoma (including Hodgkin's disease, lymphosarcoma and reticulum cell sarcoma; 27/29). Ploidy was well preserved and tumor cells could be assigned to the S and G2 stages of interphase in some pts. Marked individual variations were noted between tumor cells of the same histological type, primarily because of variations in the proportion of nonproliferating tumor cells. In tumors with a high proportion of proliferating cells the estimated generation time was higher than the observed clinical tumor growth rate; the discrepancy was accounted for by intra-node cell death. Some tumors showed marked aneuploidy, tending toward hyperdiploid or hypotetraploid numbers, without a shift in modal DNA content.

69-177 THE DEVELOPMENTAL DEFECTS ASSOCIATED WITH NEUROBLASTOMA--ETIOLOGIC IMPLICATIONS. (E.) Sy, W. M. (Coney Island Hosp., Brooklyn, N. Y.) and J. H. Edmonson. Cancer 22(1):234-238, 1968.

A male infant with neuroblastoma associated with rib malformations and syndactyly is described and 25 other cases (9 female, 16 male) reported in the literature (18 references) are discussed. The most frequent anomalies involved the heart and great vessels (13 pts.), central nervous system (5), g.i. tract (5, including 2 siblings), bones and connective tissues (9) and urinary tract (3). There were 2 cases each of hemihypertrophy and neurofibromatosis with ganglioneuroma; several other congenital anomalies were also noted in 1 case each. The absence of familial cases of neuroblastoma (only 1 family with 4/5 affected sibs has been reported) or a specific pattern of associated developmental anomalies suggests that most neuroblastomas result from sporadic postzygotic disorders.

69-178 VARIABILITY OF MOUSE MAMMARY HYPERPLASTIC NODULES MAINTAINED IN ORGANOTYPIC CULTURE. (E.) Ingraham, R. L. (U. California, Berkeley). J. Nat. Cancer Inst. 40(6):1273-1285, 1968.

Hyperplastic alveolar mammary nodules from tumor-bearing, non-pregnant, multiparous C3H/Crgl females or old virgins, sometimes pretreated with lactogenic hormones (mammotropin + somatotropin + hydrocortisone), were cultured in vitro for 6-15 days, then transplanted into young mice. Increasing the duration of in vitro culture did not affect the rate of outgrowth formation (63% of the transplanted tissues produced outgrowths) or tumor production (about 50% developed into tumors within 6 mo.). Some of the nodular outgrowths showed dense lymphocytic infiltration and others showed acidophilic cytoplasmic inclusion bodies (presumably virus); the outgrowths even of the same cultured nodule were of varied histology. The alveolar structure of the nodules almost disappeared after culture, although some of the parenchymal cells seemed viable.

69-179 SYSTEMIC EFFECTS OF HYPOPHYSIAL ISOGRAFTS IN FEMALE INBRED MICE. (E.) Briggs, R. L. (Baylor Univ. Coll. Med., Houston, Tex.), A. G. Liebelt and R. A. Liebelt. J. Nat. Cancer Inst. 40(6):1227-1244, 1968.

In virgin female BALB/c-/Ki or Af/Ki (agent-free) and BALB/c+/Ki (agent-positive) mice, single pituitary isografts from male or female donors altered the estrus cycles, increased the body wt. gain, increased fat deposition in mice examined 260 days after implantation, and stimulated food intake and bone growth in BALB/c-/Ki mice. Mammary gland stimulation was seen in all groups after 60 or 260 days, particularly in the mammary tumor virus-positive BALB/c+/Ki strain. Heart, kidney and ovarian wt., however, increased only in the agent-free mice.

69-180 EFFECT OF DIFFERENTIAL PARITY THROUGH FIVE GENERATIONS ON THE INCIDENCE OF TUMORS IN C3Hf MICE. (E.) Vellisto, I. E. (Johns Hopkins Sch. Hygiene and Public Health, Baltimore, Md.) and F. B. Bang. J. Nat. Cancer Inst. 40(6):1213-1226, 1968.

Tumor incidence was studied in 3 groups of female C3Hf mice, bred from the same pair of agent-free C3H mice: a "primiparous" line (Group I; from the first litter of each of 5 generations; 125 mice), a "multiparous" line (Group II; from the fourth to sixth litters of 5 generations; 123 mice) and 115 first-litter daughters of Group II mice (Group III). The incidence of mammary adenoma was high in Groups I and III (41.6% and 33%, resp.) and low in Group II (22.8%); the hepatoma incidence was very low in Group I (6%) and very high in Groups II and III (73% and 77.9%, resp.). The incidence of sarcomas was about the same in all groups; the incidence of mesenteric tumors was high in Group I (26 tumors) and low in Groups II and III (6 and 4 tumors, resp.). All groups of mice developed mammary tumors at advanced ages (14-15 mo.), but Group I mice developed more tumors at a higher rate than Group II. In Group III, the initial tumor mortality rate was similar to that in Group II, but after 25 mo. it was closer to that of Group I. It is concluded that a viral agent is transmitted at the time of conception through the ovarian or spermatic cytoplasm or both (hereditary symbiosis).

69-181 CHROMOSOME ABNORMALITIES IN LYMPH NODE CELLS FROM PATIENT WITH FAMILIAL LYMPHOMA. LOSS OF NO. 3 CHROMOSOME AND PRESENCE OF LARGE SUBMETACENTRIC CHROMOSOME IN RETICULUM CELL SARCOMA TISSUE. (E.) Kajii, T. (State U. New York, Upstate Med. Ctr., Syracuse), R. L. Neu and L. I. Gardner. Cancer 22(1):218-224, 1968.

A 65-yr.-old man with reticulum cell sarcoma and a prior history of radiotherapy for multiple basal cell carcinomas of the face reported a strong family history of lymphoma; 3 brothers had histologically-proven follicular lymphosarcoma or reticulum cell sarcoma (surviving 1-20 yr.), while the mother, another brother and this brother's daughter had apparently died of lymphoma. Short-term cultures of the tumor cells showed a marker chromosome replacing #3 in 100% of the cells examined. Other findings in 20 cells examined included a longer long arm of a Group 4-5 chromosome (85%), short-arm deletion of a #17-18 chromosome (60%), loss of 1-2 chromosomes in #17-18 (80%), gains of 1-3 chromosomes in group 6-12 and 1-2 chromosomes in #16 (75% and 65%, resp.) and loss of the Y chromosome (70%). The peripheral blood and 18-day tumor cell cultures showed no abnormalities.

69-182 CYTOGENETIC STUDIES IN THE MALIGNANT LYMPHOMAS AND RELATED NEOPLASMS: RESULTS IN TWENTY-SEVEN CASES. (E.) Spiers, A. S. D. (U. Melbourne, Victoria, Australia) and A. G. Baikie. Cancer 22(1):193-217, 1968.

Short-term cultures of cells from 27 pts. with follicular lymphoma (6), Hodgkin's disease (6), lymphosarcoma (5), reticulum cell sarcoma (5), chronic lymphatic leukemia (3), macroglobulinemia (1) or acute myeloid leukemia (1) showed a high incidence of chromosomal anomalies, although no 2 tumors were identical. Nearly tetraploid karyotypes tended to occur in the more anaplastic tumors; anomalies of groups 17-18 and 21-22 occurred with high frequency. An abnormal group 17-18 chromosome was noted in 3 tumors (2 Hodgkin's disease, 1 follicular lymphoma); 1 preparation of reticulum cell sarcoma showed chromosomal changes resembling those induced by SV40 virus in normal cells.

69-183 PRIMARY HEPATOCELLULAR CARCINOMA IN THREE MALE SIBLINGS. (E.) Hagstrom, R. M. (Vanderbilt U. Sch. Med., Nashville, Tenn.) and T. D. Baker. Cancer 22(1):142-150, 1968.

Primary hepatocellular carcinoma was identified in 3 brothers (age 11, 22 and 31 yr.) over a 4-yr. period. The disease progressed rapidly in all of the pts., who died 1-2 mo. after diagnosis. No other signs of associated liver disease were noted in any of the pts. Two other siblings and both parents were alive and well; a family history of malignant disease was obtained, but none of the relatives was known to have had liver carcinoma. There was no history of exposure to known liver carcinogens, although the family had previously lived in the neighborhood of several mills processing feed, grain, cotton seed and soybeans.

69-184 CHANGES IN POLYMORPHONUCLEAR LEUKOCYTES AS A MANIFESTATION OF MALIGNANT NEOPLASIA. (E.) Nieburgs, H. E. (Mount Sinai Sch. Med., New York, N. Y.) and A. F. Goldberg. Cancer 22(1):35-42, 1968.

Examination of polymorphonuclear cells from the peripheral WBC demonstrated "orderly" malignancy-associated changes (many pale circular areas surrounded by conspicuous chromatin bands) or "disorderly" changes (dark chromocenters and chromatin bands of varying sizes) in 14.5% of 131 pts. with non-malignant disease (the highest frequency was 33% in pts. with uremia), 81.4% of 70 pts. with carcinoma or adenocarcinoma, and 62.5-70.6% of 53 pts. with leukemia, lymphosarcoma or myeloma. Other nuclear changes, not considered significant for interpretation of the other anomalies, included reduced or abnormal segmentation, "target-like" lobulation or hair-like and clublike excresences of the nucleus.

69-185 CHROMOSOME NUMBERS OF NORMAL AND PRENEOPLASTIC MOUSE MAMMARY TISSUES GROWN IN VIVO AFTER MONOLAYER CULTURE. (E.) Daniel, C. W. (U. California, Berkeley) and K. Church. J. Nat. Cancer Inst. 40(6):1293-1301, 1968.

Normal mammary tissue from a pregnant C57/Crgl mouse showed no heteroploidy when obtained or in 2 transplants without intervening in vitro cultivation. A 6-day-old culture showed a low incidence of hyperdiploid (45-65 chromosomes) and tetraploid (about 80 chromosomes) cells (7/98 and 9/98 cells, resp.), but in vivo transplants of cultured cells showed no heteroploidy. The cells of a premalignant hyperplastic alveolar mammary nodule from a C3H/Crgl mouse were almost entirely diploid when first obtained; after short-term cultivation, about 10% of the cells were heteroploid. Outgrowths from cultured tissue showed a marked shift in ploidy; 50-98% of the cells were heteroploid, usually within the tetraploid range.

69-186 PROTRUDING CHROMOSOME ARMS IN HISTOLOGICAL SECTIONS OF TUMOURS WITH LARGE MARKER CHROMOSOMES. (E.) Brandão, H. J. S. (Mt. Vernon Hosp., Middlesex, England) and N. B. Atkin. Brit. J. Cancer 22(2):184-191, 1968.

Chromosome morphology was studied in tumors from 19 women and 2 men with reticulum cell sarcoma (1/21) or epithelial tumors of the breast (1; spheroidal cell carcinoma), cervix uteri (7; 1 adenoacanthoma, 6 squamous cell carcinoma), bladder (2; transitional or squamous cell carcinoma), ovary (2; papillary adenocarcinoma), endometrium (5; adenocarcinoma of several types) or colon (3; columnar cell adenocarcinoma), as well as non-neoplastic tissues from 9 pts. The incidence of metaphase, anaphase and telophase figures containing at least 1 protruding chromosome arm (2 microns or more in length) was 0-3.2% in non-malignant tissues, compared to a mean of 3% (max. 6%) in 8 tumors without large marker chromosomes and 18.8% (range 10-23%) in 12/13 tumors with 1 or more large markers (in 1 tumor the incidence was 6%). It is concluded that the presence of protruding chromosome arms in 10% or more of the mitotic figures indicates the presence of 1 or more abnormal chromosomes.

69-187 MALIGNANT LYMPHOMAS OCCURRING IN MARITAL PARTNERS: CASE REPORTS ON TWO COUPLES. (E.) Takáts, L. J. (U. Szeged, Hungary) and Z. Csapó. Brit. J. Cancer 22(2): 173-175, 1968.

Two elderly couples (age 61-79) are described: the older partners with lymphatic leukemia of a relatively benign course (1/2 survived about 4 yr., 1/2 for 2 yr.) and dying of heart disease, the younger partners with reticulum cell sarcoma of a fulminating, rapidly fatal type (1/2 survived 3 mo., 1/2 for 7 mo.). One of these couples had been married for 1 yr. before the previously healthy husband developed reticulum cell sarcoma; the wife had a 2-yr. history of leukemia and a 5-yr. history of a benign lung tumor (identified as a hamartoma at autopsy) before marriage. In the other couple, the husband had at least a 1-yr. history of leukemia before the wife developed reticulum cell sarcoma. Both couples lived far from each other, on farms under conditions of extreme isolation; neither couple was consanguineous. It is suggested that if a virus induced leukemia in 1 partner, passage of the agent to the other partner may have enhanced its virulence.

69-188 PAPILLARY ADENOCARCINOMA ARISING IN A THYROGLOSSAL DUCT REMNANT. (E.) Latimer, R. G. (Latter-day Saints Hosp., Salt Lake City, Utah), E. Snow and H. G. Hicks. Arch. Surg. (Chicago) 97(1):161-162, 1968.

A 31-yr.-old white woman with a neck mass of 6 mo. duration (which had developed after 7 mo. of pregnancy) underwent excision of the mass and the midportion of the hyoid bone. The pathological diagnosis was papillary adenocarcinoma of the thyroglossal duct remnant. Previously published reports of this tumor (18-28 cases), which usually arises in females (the sex ratio is 2:1) at a mean age of 41 yr. (range 6-75 yr.), are discussed.

69-189 PRIMARY CARCINOMA OF URETER ASSOCIATED WITH DIABETES. (E.) Vazakas, G. E. (Albert Einstein Coll. Med., New York, N. Y.) and H. R. Newman. New York J. Med. 68(14):1942-1946, 1968.

Clinical data of 3 women and 10 men (age 39-87; 10/13 were over 70) with primary transitional cell carcinoma of the ureter (Grade I-III) are discussed. The incidence of ureteral carcinoma in the authors' urology practice was 1:1500 (over-all reported incidence 1:3690 from a literature survey). Several pts. showed other tumors of the urinary tract (renal cell carcinoma, papillary pelvic carcinoma, renal cortical adenoma, transitional cell carcinoma of the bladder). One pt. died of unsuspected chronic lymphocytic leukemia 19 mo. after surgery for ureteral carcinoma; the surgical specimen had showed chronic pyelonephritis and lymphocytosis in the removed kidney. Nearly all pts. had chronic urinary infection; 6/13 showed urinary obstruction by prostatic hypertrophy. Another possible etiologic factor was diabetes mellitus; 9/13 showed elevated blood glucose levels, which were associated with frank diabetes in 2/9 and pancreatic carcinoma in 1/9.

69-190 DESQUAMATIVE INTERSTITIAL PNEUMONIA WITH HEPATOSPLENOMEGALY AND LARYNGEAL CARCINOMA. (E.) Ayvazian, L. F. (Will Rogers Hosp., Saranac Lake, N. Y.), D. S. Steward and R. G. Gould. New York J. Med. 68(14):1959-1964, 1968.

A 67-yr.-old man, a heavy smoker for >50 yr., presented with hoarseness of 1 yr. duration. Interstitial pneumonia of the desquamative type was identified by biopsy; laryngeal examination showed epidermoid carcinoma in situ of 1 vocal cord, which was removed surgically. The clinical and possibly the X-ray signs of pneumonia improved markedly during and after 18 mo. of prednisone therapy, although the finger clubbing, pulmonary function and arterial oxygen unsaturation remained unchanged; the pt. remained in good condition 4 mo. after the end of treatment. Asymptomatic hepatosplenomegaly was present at diagnosis and remained unchanged throughout the observation period. No jaundice or liver function changes were noted; biopsy showed slight fatty metamorphosis, but no cirrhosis or other specific liver disease. The possibility that the laryngeal tumor was a complication of interstitial pneumonia is discussed; the hepatosplenomegaly could not be explained.

69-191 SYNDROME OF BILATERAL PHEOCHROMOCYTOMA, MEDULLARY THYROID CARCINOMA AND MULTIPLE NEUROMAS. A POSSIBLE REGULATORY DEFECT IN THE DIFFERENTIATION OF CHROMAFFIN TISSUE. (E.) Schimke, R. N. (Johns Hopkins U. Sch. Med., Baltimore, Md.), W. H. Hartmann, T. E. Prout and D. L. Rimoin. New Eng. J. Med. 279(1):1-7, 1968.

Two women (age 23 and 53) and 1 man (age 25) with metastatic medullary thyroid carcinoma (showing typical pleomorphism and amyloid stroma), histories of g.i. malfunction (2/3 showed a dilated colon and 1/2 had developed malabsorption following surgery for a duodenal ulcer), multiple neurofibromatosis and hypocalcemia are discussed. An acromegalic facies was present in 2 pts., but no signs of pituitary hyperfunction were noted. The age at onset was 16-19 yr. in 2/3 and 37 yr. in 1/3; the 2 younger pts. survived 7.5-8.5 yr. and the oldest pt. was still under observation at the time of report, about 16 yr. after onset. Bilateral pheochromocytoma was found at autopsy in the 2 pts. who died, but was not found in the other pt. Although all of these pts. had negative family histories for café-au-lait spots, neurofibromatosis, pheochromocytoma or known carcinoma of the thyroid, an inherited defect of chromaffin tissue differentiation is postulated.

69-192 CYTOGENETIC EVOLUTION AND CLONAL PROLIFERATION IN ACUTE TRANSFORMATION OF CHRONIC GRANULOCYTIC LEUKAEMIA. (E.) Spiers, A. S. D. (U. Melbourne Dept. Med., Australia) and A. G. Baikie. Brit. J. Cancer 22(2):192-204, 1968.

Chromosome morphology was studied in 2 men with chronic granulocytic leukemia: 1/2 responded poorly to chemotherapy + radiotherapy and died 11 mo. after diagnosis (12 wk. after acute transformation) and 1/2 responded to treatment for 3 yr., then developed acute transformation and responded to treatment for another 12 mo. Both pts. showed cell lines with the Philadelphia (Ph^1) chromosome. In the first pt., many cell lines were seen in samples examined during the chronic phase; all were probably derived from a diploid, Ph^1-positive ancestral strain, but most were removed from this archetype by 1 or more traceable steps. Cells from the other pt. showed a wide variety of karyotypes, but many cells had 2 Ph^1 chromosomes and numerical anomalies in groups 13-15, 17 and 18; in addition, 13/97 cells showed 3 different abnormal marker chromosomes. Both pts. showed cell lines tending to accumulate extra autosomes, particularly of groups 6-12 + X, 21 and 22. Karyotypes obtained during acute transformation were highly variable.

69-193 EXPERIMENTAL STUDY OF RELATIONSHIP BETWEEN HYPERTENSION AND TUMOR GROWTH AND METASTASES. (E.) Fisher, E. R. (U. Pittsburgh Sch. Med., Pittsburgh, Pa.), H. R.

Hellstrom and B. Fisher. Brit. J. Cancer 22(2): 342-345, 1968.

Rats with hypertension of 1 wk. duration, induced by renal artery constriction or unilateral nephrectomy followed by deoxycorticosterone acetate admin. (5 mg/d s.c.) and substitution of 1% saline for drinking water, were inj. s.c. or intraportally with Walker 256 carcinosarcoma. The growth and metastases of s.c. tumors were not affected by hypertension. The incidence of liver tumors induced by intraportal tumor cell inoc. increased to 57% in rats with renal hypertension, compared to 32-35% in sham-operated or nonoperated controls; the incidence of lung metastases was 3-4% in all groups. The steroid had no effect on the incidence or spread of the tumor. Tumor growth did not influence blood pressure. The discrepancy between these results and previous clinical reports suggesting an inverse relationship between hypertension and cancer is discussed.

69-194 THE NUCLEOLAR RNA OF MINIMAL DEVIATION HEPATOMAS. (E.) Muramatsu, M. (Cancer Inst., Tokyo), T. Higashinakagawa, T. Ono and H. Sugano. Cancer Res. 28(6):1126-1137, 1968.

Nucleolar RNA (nRNA) from Morris 5123D rat hepatoma had about the same sedimentation profile and orotic acid uptake kinetics as normal rat liver. The base compositions of newly synthesized nRNA from the 5123D and 7316B hepatomas were widely different from that of normal rat liver (with low adenine and high cytosine contents after 15-min. and 60-min. ^{32}P pulses) but resembled those of nRNA from more rapidly growing, undifferentiated rat tumors (Walker 256 carcinosarcoma or Novikoff hepatoma). The difference in base composition between tumor and normal or regenerating rat liver nRNA is discussed, with reference to the behavior of nucleolar 45S RNA.

69-195 EFFECT OF SPLENECTOMY ON THE REGRESSION OF TRANSPLANTABLE TUMORS. (E.) Ferrer, J. F. (Roswell Park Mem. Inst., Buffalo, N. Y.) and E. Mihich. Cancer Res. 28(6):1116-1120, 1968.

The incidence of spontaneous regression of solid Sarcoma 180 (S-180) was increased by splenectomy (splx.) in adult Swiss HaICR mice; regression of S-180/B6 was increased by splx. in AKR mice but not in strain C57BL/6Ja or C3Hf/HeHa mice. The incidence of regression of Ehrlich ascites carcinoma was increased by splx. in adult HaICR mice in which S-180 had previously regressed twice, but not after only 1 regression of S-180. S-180 regression induced by 6-mercaptopurine (25 mg/kg/day) or kethoxal-bis(thiosemicarbazone) (0.1% in diet) in HaICR mice was increased by splx., but tumor regression caused by vitamin B_6 (pyridoxine) deficiency (PD) was not affected. PD-induced regression of S-180 was less marked in neonatally splx. + thymectomized mice. It is suggested that selective therapeutic effects on S-180 depend in part on changes in the balance between cellular immunity and tumor-induced humoral antibody responses.

69-196 CHROMOSOMAL ABERRATIONS IN MALIGNANT DISEASES OF THE BLOOD. (Fr.) Engel, E. (Vanderbilt U., Nashville, Tenn.), L. C. McKee and M. Engel-de Montmollin. Union Med. Canada 97(7):901-906, 1968.

Chromosome anomalies were noted in WBC from 38/58 adults with acute leukemia (10), chronic myeloid leukemia (CML; 22/58, 10/22 in acute transformation) or myeloproliferative syndromes (16). The Philadelphia chromosome (Ph^1) was present in 17 pts. with CML. Chromosome anomalies in the other 21 pts. involved groups C (17/21; many types of anomalies were noted), D (5/21; missing in 1/5, partial long-arm deletion in 2/5, extra chromosome in 2/5), E_{17-18} (4/21; long-arm isochromosome or partial deletion in 2/4 and 1/4, resp.; pericentric inversion or translocation in 1/4) or G (8/21; missing in 4/8, extra chromosome in 4/8). Some pts. showed chromosomal anomalies involving several groups, but 2 pts. showed anomalies involving only group E. Anomalies in groups A, B and F were rare. No correlation was noted between the type of leukemia and specific chromosomal changes, with the exception of the Ph^1 chromosome in CML. Successive evolution of the disease by addition of new anomalies was seen in a few pts.

69-197 SEROLOGICAL STUDIES OF ANTIGENIC CHANGES OCCURRING IN TWO LINES OF EHRLICH'S ASCITES TUMOR AFTER LONG PERIODS OF CULTIVATION IN VITRO. (E.) Monti-Bragadin, C. (Fibiger Lab., Kgs. Lyngby, Denmark) and J. Kieler. Europ. J. Cancer 4(3):255-261, 1968.

The antigenic properties of the nearly tetraploid (ELT) and nearly diploid (ELD) strains of Ehrlich ascites carcinoma propagated for 3.5 and 5.5 yr., resp., in vitro (ELTc and ELDc) or in mice (ELTa and ELDa) were studied. Experiments with antisera from C3H and ST/a mice demonstrated at least 1 substance antigenic to ST/a mice in all cell lines, but it was not present in sufficient levels in the ELTa or ELTc cells to give a positive trypan blue test. All cell lines also contained at least 1 substance antigenic to C3H mice, which was present in all lines in sufficient quantity to give a positive trypan blue test. The ELDa and ELDc cells each contained at least 1 antigen not found in the other 3 cell lines. Cytotoxic antibodies decreased in both the ELT and ELD cells after prolonged in vitro cultivation, possibly as a result of a decrease in surface antigen conc.

69-198 CYTOGENETIC AND ANTIGENIC PROPERTIES OF GW-127, A HETEROLOGOUSLY TRANSPLANTABLE

TUMOR. (E.) Haemmerli, G. (U. Zurich), W. Schmid and J. Lindemann. Europ. J. Cancer 4(3):279-285, 1968.

The properties of the GW-127 human ovarian carcinoma were studied after 9 cheek pouch transplants and 1 ascites transplant generation (obtained after 14 cheek pouch transplants) in unconditioned hamsters. The tumor was highly virulent; av. survival times in hamsters with ascites and solid (s.c. or cheek pouch) tumors were 6-7 and 10-11 days, resp., and multiple metastases were formed. Chromosome analysis of cheek pouch and ascites tumors (4 hr. after i.p. admin. of vinblastine) showed modal chromosome numbers of 61 and 62, resp.; the acrocentric chromosomes of the tumor cells resembled hamster chromosomes more closely than human chromosomes. Several precipitation lines developed between rabbit antisera (including anti-GW-127 sera) and hamster tissue extracts, with weaker lines between the sera and human tissue extracts. It is concluded that the GW-127 carcinoma has lost most of its human characteristics and has been replaced by a hamster tumor.

69-199 GRAFTING OF HeLa CELLS IN YOUNG CHICK BLASTODERMS. (E.) Mareel, M. (U. Ghent, Belgium), L. Vakaet and L. De Ridder. Europ. J. Cancer 4(3):249-253, 1968.

HeLa cells and testicular fragments from full-term mouse fetuses were transplanted into blastoderms from Stage 4 or 7 chick embryos and incub. in vitro for 24 hr. The blastoderm developed normally; the mesoblast crowded against the grafts, the ectoblast was undamaged and the endoblast covered the testis grafts, but not the tumor cells. Both grafts developed well but the HeLa cells did not invade the embryonic tissue. HeLa grafts without endoblast evoked a streak-like reaction in the ectoblast layer after medio-caudal implantation.

69-200 IDIOPATHIC DIFFUSE INTERSTITIAL PULMONARY FIBROSIS (FIBROSING ALVEOLITIS), ATYPICAL EPITHELIAL PROLIFERATION AND LUNG CANCER. (E.) Haddad, R. (VA Hosp., Washington, D. C.) and D. Massaro. Amer. J. Med. 45(2):211-219, 1968.

Atypical epithelial proliferation (epithelium characteristic of proximal airways in very distal air spaces; squamous cell and other metaplasia in areas of predominantly cuboidal or columnar cells; stratification of cells) was noted in 8 pts. with pulmonary fibrosing alveolitis. All pts. were smokers. Unequivocal signs of malignancy were noted in 3 pts. (oat cell carcinoma or undetermined carcinoma in 1/3, poorly differentiated peripheral adenocarcinoma in 1/3, poorly differentiated peripheral adenocarcinoma in 1/3, peripheral epidermoid carcinoma with areas of adenocarcinoma in 1/3). The areas of atypical epithelial proliferation and of cancer were sometimes independent of each other and sometimes present in adjacent areas; in 2 pts., transitional stages between normal epithelium, atypical proliferation and invasive cancer were seen.

69-201 CLEAR CELL HIDRADENOMA OF THE BREAST. (E.) Finck, F. M. (U. Southern California Sch. Med., Los Angeles), C. P. Schwinn and L. E. Keasbey. Cancer 22(1):125-135, 1968.

On the basis of microscopic examination of clear cell hidradenomas of the breast from 1 man and 5 women, this tumor is classified as a form of ductal papillomatosis. It is suggested that the clear cell hidradenoma develops from a multipotential reserve cell, which is normally differentiated into the mammary, salivary, sebaceous and pilar glands. This concept was supported by data from 2 pts., whose tumors were never connected with the skin or its adnexa and obviously arose from cells of the duct lining; the other 4 tumors showed only superficial involvement of the nipple and areola, which contain few or no sweat glands.

69-202 HYPERTRICHOSIS LANUGINOSA (ET TERMINALIS) ACQUISITA AS A PARANEOPLASTIC SYNDROME. (Ger.) Herzberg, J. J. (City Hosp., Bremen, Germany), K. Potjan and D. Gebauer. Arch. Klin. Exp. Derm. 232:176-186, 1968.

Lanugo-type hypertrichosis developed in a 65-yr.-old man with a history of polyneuritis (10 yr. previously) and icterus (5 yr. previously). Most laboratory tests were within normal limits, but hepatic biopsy showed carcinoma metastases in the liver. The primary tumor was not identified until autopsy (4 mo. later), which showed a large carcinoma of the gallbladder with numerous liver metastases. In this pt. and 2 similar cases from the literature (a total of 3/5 of the reported cases), the clinical symptoms and hypertrichinosis coincided not with the beginning of tumor formation, but with the formation of metastases. The disease was seen as an anagen synchronization wtih a prolonged anagen stage, an increased rate of hair growth and possibly a second morphogenetic differentiation from the vellus into terminal follicles. Since no endocrine basis for this type of hypertrichosis could be found by hormone analysis, this condition was assumed to be a rare cutaneous paraneoplastic syndrome, with a visceral carcinoma as a possible etiologic factor.

69-203 CARCINOMA OF THE UTERUS WITH UNUSUAL HISTOLOGICAL DIFFERENTIATION. (Ger.) Bräunig, G. (U. Women's Clin. Heidelberg, Germany) and K. Lohe. Arch. Gynaek. 206:51-63, 1968.

Histological findings of a carcinosarcoma removed from a 60-yr.-old woman are discussed in detail. The tumor was characterized by cell structures strongly resembling vegetative ganglion cells; the absence of Nissl's granules, endocellular fibrils, dendrites and axons suggested marked regressive changes, but it was not possible definitely to establish their ganglion cell character. Some areas of this tumor resembled intracanalicular fibroadenoma of the breast; because of its size, it was described as a "miniature cystosarcoma phylloides." Because of the fact that this mixed tumor grew in some areas like a cystosarcoma phylloides, it was classified as a "composite tumor," as opposed to a "collision tumor" or "combination tumor." Autopsy showed extensive metastases, but these contained only the carcinomatous components of this mixed tumor. It is suggested that the ganglion cells of the primary tumor arose from the migration of multipolar sympathetic ganglion cells into the uterus (ganglion cells are reportedly rare in the uterine wall) by an orthograde pathway via the neural border from the cervix uteri.

69-204 CELL CHROMOSOMES IN ACUTE CHILDHOOD LEUKEMIA. (Ger.) Lampert, F. (U. Erlangen-Nuremberg, Germany) and J. U. Gauger. Klin. Wschr. 46(16):882-887, 1968.

Chromosome analysis of bone marrow cells from 17 (age 5 mo.-17.3 yr.; 12 boys, 5 girls) with acute leukemia (12 lymphoblastic, 4 myelocytic, 1 monocytic) demonstrated a modal chromosome number (stem line) in each leukemic cell population. WBC chromosomes in 2 children examined before therapy and during relapse showed the same modal number. In 4/12 children with acute lymphoblastic leukemia, the karyotype was an euploid with stem lines of 50-59 chromosomes. All pts. with myelocytic and monocytic leukemia showed the normal diploid chromosome number (46). Extra chromosomes within the aneuploid cell populations were found in groups C, D, E or G. The changes in the genome were constant within a given leukemic cell population and were probably transmitted from mother to daughter cell, but the alterations differed from 1 pt. to another. Structurally, the chromosomes from leukemic cells differed quite noticeably from those of normal cells; they were thicker and often glued together, the chromatids were clumped and less twisted and a definite disturbance in spiral formation was noted. The leukemia chromosomes seemed stickier than normal chromosomes, which was suggested as a cause of their aneuploid character. Chromosomal changes of this type can be associated with an intranuclear virus infection with a persistent virus genome.

69-205 VARIABILITY OF KARYOTYPES AND PIGMENT-PRODUCING ENZYMES IN A HAMSTER MELANOMA. (E.) Tritsch, G. L. (Roswell Park Mem. Inst. Buffalo, N. Y.), N. Takagi, G. E. Moore and A. A. Sandberg. J. Nat. Cancer Inst. 40(5):877-890, 1968.

Chromosome morphology and enzymes responsible for DOPA (3-(3,4-dihydroxyphenyl)-L-alanine) metabolism were studied in several pigmented culture sublines of the RPMI-3460 pigmented hamster melanoma and in solid tumors derived from these sublines. Since these cell lines differed widely with respect to heat stability and the effects of pH on the max. velocity (V) and the Michaelis constant (K_m), the curves of pK_m and log V versus pH could not be interpreted in the usual manner, but none of the breaks in the curves corresponded to possible pK' values for DOPA. The first sample from the original cultured tumor showed a wide range of chromosome numbers (42-99), with a flat mode at 45 and a wide variety of markers. Subline A from this sample showed a mode of 49 chromosomes and 3 markers; another *in vitro* subline (B) had a mode of 51 chromosomes and several karyotypic differences from both the original line and subline A. Solid tumors from both sublines had modes of 50 chromosomes and karyotypes differing from the cultured sublines. A complex pattern of selection, rather than changes in the mechanism controlling enzyme biosynthesis, is suggested as the cause of the differences in enzyme production *in vitro* and *in vivo*.

69-206 ULTRASTRUCTURAL EVIDENCE FOR ASTROGLIAL HISTOGENESIS OF THE MONSTROCELLULAR ASTROCYTOMA (SO-CALLED MONSTROCELLULAR SARCOMA OF BRAIN). (E.) Lynn, J. A. (Baylor U. Med. Ctr., Dallas, Tex.), I. T. Panopio, J. H. Martin, M. L. Shaw and G. J. Race. Cancer 22(2):356-366, 1968.

69-207 RENAL CARCINOMA AND TRANSITIONAL CELL CARCINOMA IN THE SAME KIDNEY. (E.) Walker, D. (U. Florida Teaching Hosp. Clin., Gainesville) and W. P. Jordan, Jr. Southern Med. J. 61(8):829-832, 1968.

69-208 CHRONIC ULCERATIVE COLITIS ASSOCIATED WITH MALIGNANT DISEASE. (E.) Peltokallio, P. (University Central Hospital, Helsinki). Ann. Chir. Gynaec. Fenn. 57(2):225-228, 1968.

69-209 CARCINOMA OF THE PANCREAS IN ASSOCIATION WITH CHRONIC PANCREATITIS. (E.) Weinstein, E. C. (17050 Chatsworth St., Granada Hills, Calif.). J. Amer. Geriat. Soc. 16(8):952-955, 1968.

69-210 CARCINOMA OF THE PANCREAS STIMULATING GIANT CELL TUMOR OF BONE. (E.) Rosai, J. (Washington U. Sch. Med., St. Louis, Mo.). Cancer 22(2):333-344, 1968.

69-211 DECREASED FORMATION OF ERYTHROCYTE ANTIGEN A AND A CONSISTENT CHROMOSOME ABNORMALITY IN A PATIENT WITH MYELOMONOCYTIC LEUKEMIA. (E.) Ragen, P. A. (Mason Clinic, Seattle, Wash.), P. McGuire and J. I. Antonius. Acta Haemat. (Basel) 39(5):309-319, 1968.

69-212 IMMUNE RESPONSE IN TUMOR-BEARING PATIENTS AND ANIMALS. III. DOES TUMOR ASCITES CONTAIN TOLERANCE-INDUCING AGENTS? (E.) Sekiguchi, M. (Inst. Med. Sch., Tokyo) and Y. Ishibashi. Gann 59(2):167-170, 1968.

69-213 COINCIDENT BASOPHILIC CHRONIC MYELOGENOUS LEUKEMIA AND PULMONARY TUBERCULOSIS, ASSOCIATED WITH EXTREME ELEVATIONS OF BLOOD HISTAMINE LEVELS AND MATURITY ONSET ASTHMA. (E.) Shohet, S. B. (Peter Bent Brigham Hosp., Boston, Mass.) and S. F. Blum. Cancer 22(1):173-174, 1968.

69-214 MULTIPLE MUCOSAL NEUROMAS, PHEOCHROMOCYTOMA AND MEDULLARY CARCINOMA OF THE THYROID-A SYNDROME. (E.) Gorlin, R. J. (U. Minnesota Sch. Dent., Minneapolis), H. O. Sedano, R. A. Vickers and J. Cervenka. Cancer 22(2):293-299 and 479, 1968.

69-215 ELECTRON MICROSCOPY OF INDUCED SECRETION IN MAMMARY EPITHELIAL CELLS OF HYPOPHYSECTOMIZED-OVARIECTOMIZED-ADRENALECTOMIZED BALB/cCrgl MICE. (E.) Wellings, S. R. (U. Oregon Med. Sch., Portland) and S. Nandi. J. Nat. Cancer Inst. 40(6):1245-1258, 1968.

69-216 A NOTE ON THE TRANSPLANTABILITY OF ORGAN-CULTURED NORMAL MOUSE MAMMARY TISSUES. (E.) Bern, H. A. (U. California, Berkeley, Calif.), D. Brown and R. L. Ingraham. J. Nat. Cancer Inst. 40(6):1267-1271, 1968.

AUTHOR INDEX

Achong, B. G. 101
Aikat, B. K. 64
Akao, M. 28
Alstein, A. D. 141
Altman, R. F. A. 11
Antonius, J. I. 211
Araki, M. 97
Archer, P. G. 25
Arcos, J. C. 51
Argus, M. F. 51
Atkin, N. B. 186
Auerbach, O. 71
Ayvazian, L. F. 190

Baikie, A. G. 182,192
Baker, T. D. 183
Bang, F. B. 180
Baylor, C. H. 169
Beard, D. 121
Beard, J. W. 121
Begeman, C. R. 56
Beker, S. 149
Benoit, W. 87
Bensted, J. P. M. 49
Bentvelzen, P. 130
Berger, H. 18
Bern, H. A. 216
Berndt, H. 172
Bivens, M. D. 166
Blair, P. B. 119,134
Bloom, A. D. 25
Blum, S. F. 213
Bock, F. G. 6,65,73
Bogardus, G. M. 5
Boger, E. 67
Bohlig, H. 14
Bonhag, R. S. 134
Botkin, C. 92
Brachmann, I. 85
Brandão, H. J. S. 186
Braunig, G. 203
Briggs, R. L. 179
Brill, E. 40
Bross, I. D. J. 70
Brown, D. 216
Brown, E. V. 96
Bücheler, J. 89,90
Buell, P. E. 32
Butel, J. S. 139
Buu-Hoi, N. P. 42

Calcutt, G. 83
Calderoni, F. J. 41
Campbell, S. D. 22
Cardiff, R. D. 119
Carnow, B. W. 62
Carter, R. L. 60
Casarett, L. J. 9
Castillo, J. 27
Casto, B. C. 142
Cavalleri, A. 59
Cervenka, J. 214
Chablani, T. D. 165
Chang, L. M. S. 116
Chiga, M. 29
Chopra, H. C. 131
Church, K. 185
Colucci, J. M. 56
Cooper, E. H. 176
Cooper, J. T. 77
Crane, S. C. 98
Crittenden, L. B. 125
Csapó, Z. 187
Cummins, G. T. M. 164
Curphey, T. J. 80

Dacka, E. 170
Dale, E. 61
Dalhamn, T. 65,72
Dalton, A. J. 132
Daniel, C. W. 185
Dannenberg, H. 85
Davis, W. C. 154
Dawe, C. J. 175
de Gonzalez, M. 149
de Harven, E. 104,122
Deisenhammer, E. 15
De La Vega, G. A. 150
DeOme, K. B. 137
De Ridder, L. 199
De Tkaczevski, L. 122
Diamandopoulos, G. T. 113,145
Dick, R. G. 47
DiPaolo, J. A. 115
Dodonova, N. N. 141
Dörfler, H. 87
Drozdzewska, Z. 156
Druckrey, H. 89,90
Duffy, J. J. 96
Dulbecco, R. 114
Dunn, J. E., Jr. 32,158
Dux, A. 133,173

Edmonson, J. H. 177
Ehrhart, H. 87
Elkind, M. M. 16,17,26
Elmenhorst, H. 84
Encut, I. 95
Engel, E. 196
Engel-de Montmollin, M. 196
Engelhardt, K. 91
Epstein, M. A. 101
Epstein, S. S. 45,53

Fabian, J. A. 51
Favino, A. 59
Fefer, A. 105,109
Feller, W. F. 131
Ferrer, J. F. 195
Finck, F. M. 201
Finkel, A. J. 24
Fischinger, P. J. 127
Fisher, B. 193
Fisher, E. R. 193
Flaks, B. 33
Fleetwood, H. O. 166
Forbes, W. F. 77
Foster, R., Jr. 107
Fraumeni, J. F. 168
Fredrickson, D. T. 52
Freeman, G. 98
Friedman, H. 123
Friedman, R. M. 117
Friend, C. 122
Fülöp, T. 146
Furiosi, N. J. 98

Gadomska, H. 156
Gardner, L. I. 181
Garfinkel, L. 71
Gauger, J. U. 204
Gebauer, D. 202
Geglowski, W. S. 123
George, T. W. 81
Gérard-Marchant, R. 176
Gerwig, T. 23
Gieseke, J. A. 4
Ginsberg, H. S. 143
Glynn, J. P. 105
Goldberg, A. F. 184
Goldenberg, D. M. 13
Goldschmidt, B. M. 66
Goldsmith, H. S. 27
Goldstein, J. A. 39
Gordon, D. E. 120
Gorlin, R. J. 214
Gould, R. G. 190
Grant, G. A. 60
Griem, W. 91
Griffith, G. W. 162
Grimmer, G. 84
Grob, K. 79

Haddad, R. 200
Hadjiolov, D. 88
Haemmerli, G. 198
Haerer, A. F. 153
Hageman, P. C. 130
Hagstrom, R. M. 183
Halter, H. M. 75
Hamilton, T. 50
Hamlin, I. M. E. 176
Hammond, E. C. 68,71
Hartmann, W. H. 191
Hashimoto, Y. 38
Hasterlik, R. J. 24
Hecker, E. 86
Heine, U. 121
Hellstrom, H. R. 193

Henle, W. 100
Herzberg, J. J. 202
Heston, W. E. 174
Hickey, J. L. S. 22
Hicks, H. G. 188
Hien, D. P. 42
Higashinakagawa, T. 194
Hilf, R. 54
Hill, J. A. 168
Hirono, I. 93,94
Hodes, M. E. 116
Hoffmann, D. 76
Homburger, F. 65,67
Hopp, M. 86
Hopsu-Havu, V. K. 44
Horn, D. 69
Huber, A. 151
Hundeiker, M. 18
Hutchison, G. B. 20

Ingraham, R. L. 178,216
Ino, S. 147
Ioannides, G. 160
Ishibashi, Y. 212
Ivankovic, S. 89
Izard, J. 104

Jackson, B. A. 46
Jackson, F. C. 154
Jerkofsky, M. 112
Johnson, D. E. 8
Jordan, W. P., Jr. 207

Kagaya, Y. 28
Kajii, T. 181
Kandarkar, S. V. 63
Kanisawa, S. 28
Kannel, W. B. 65
Kastelan, A. 136
Kawashima, Y. 147
Kawazoe, Y. 97
Kaye, A. M. 35,36
Keasbey, L. E. 201
Kelly, M. G. 92,175
Kempson, R. L. 31
Kieler, J. 197
Kiese, M. 43
Kirchmyer, R. 107
Kirman, D. 71
Kirsten, W. H. 126
Konikov, N. F. 31
Koszarowski, T. 156
Kothari, M. L. 10
Krebsforsch, Z. 171
Kume, F. 29
Kyriakos, M. 31

Lakhanpal, U. 165
Lampert, F. 204
Langseth, L. 66
Laqueur, G. L. 93,94
Larson, P. S. 1
Latimer, R. G. 188
Law, L. W. 128,129
Lawrence, C. H. 57
Lawson, L. J., Jr. 24
Lee, A. E. 118
Levine, A. J. 143
Liciu, F. 95
Liebelt, A. G. 179
Liebelt, R. A. 179
Lin, F. H. 124
Lindemann, J. 198
Links, J. 130
Lohe, K. 203
Lynn, J. A. 206

Malmgren, R. A. 115
Mányi, G. 146
Mareel, M. 199
Máquez-Monter, H. 150
Martin, J. H. 206
Massaro, D. 200
Masukawa, T. 147
Mathe, G. 106
Mauro, F. 16,17,26
McCoy, J. L. 105
McGuire, P. 211
McGuire, W. L. 99
McKee, L. C. 196
McKinney, G. R. 47
Medina, D. 137
Melnick, J. L. 140
Mendez, W. M. 32
Metcalf, D. 107
Meyer, A. T. 103
Middleton, P. A. 99
Mihich, E. 195
Millar, J. D. 8
Millard, R. E. 176
Miller, R. W. 152,167,168
Millian, S. J. 108
Mironescu, K. 95
Mironescu, S. 95
Mitchell, R. I. 4
Mitoma, C. 41
Miyaki, K. 28
Moloney, J. B. 109
Monti-Bragadin, C. 197
Moore, G. E. 65,73,205
Morgan, J. M. 159
Morgan, W. D. 175
Moshy, R. J. 75
Motta, R. 106
Mühlbock, O. 133,173
Muramatsu, M. 194

Nabar, B. V. 148
Nakayama, P. 119
Nandi, S. 135,215
Nash, F. A. 159
Nau, C. A. 57
Nazari, G. 59
Neiders, M. E. 110,111
Neriishi, S. 25
Neu, R. L. 181
Neubauer, S. E. 41
Newman, H. R. 189
Nieburgs, H. E. 184
Nishizuka, Y. 48

O'Connor, T. E. 127
Odashima, S. 38
O'Gara, R. W. 92,175
Okazaki, W. 125
Olson, C. 120
O'Malley, B. W. 99
Omar-Ahmad, U. 12
Ono, T. 194
Oppenheim, A. 52

Panopio, I. T. 206
Pastan, I. 117
Payne, L. N. 125
Peckham, M. J. 176
Peltokallio, P. 208
Peraza, G. 149
Petres, J. 18
Pike, M. C. 60
Plagemann, P. G. W. 144
Potjan, K. 202
Potter, M. 132
Preussmann, R. 89,90
Prout, T. E. 191
Prutkin, L. 34

Race, G. J. 206
Ragen, P. A. 211
Ragland, W. L. 138
Ramanathan, K. 12
Rapp, F. 112,139
Reddy, D. B. 157
Reed, W. B. 19
Rhoades, J. W. 8
Richart, R. M. 164
Richter, G. W. 46
Ridaura, C. 150
Ried, W. 87
Rimoin, D. L. 191
Ritter, R. I. 135
Robinson, E. 161
Robinson, J. C. 77
Robles, M. 150
Robson, A. S. 115
Roe, F. J. C. 60
Rondia, D. 45
Rosai, J. 210
Roth, D. 52
Rowe, N. H. 2
Rylander, R. 7,65

Sakamoto, K. 26
Sandberg, A. A. 205
Santti, R. S. S. 44
Saran, B. M. 157

Schaeffer, M. 108
Schimke, R. N. 191
Schmeltz, I. 55
Schmid, W. 198
Schnopfhagen, O. 15
Schoental, R. 49
Schwinn, C. P. 201
Scutchfield, F. D. 61
Sedano, H. O. 214
Segal, A. 66
Sekiguchi, M. 212
Sengupta, P. 64
Shachat, D. A. 109
Shafner, H. 53
Shaw, M. L. 53,206
Shimkin, M. B. 30
Shisa, H. 48
Shohet, S. B. 213
Silvette, H. 1
Sirsat, S. M. 63
Sirsi, M. 58
Sivak, A. 66
Smith, C. G. 57
Smith, R. R. 153
Smoller, C. 134
Sneddon, A. 50
Snow, E. 188
Somers, K. D. 126
Sorieul, S. 106
Spatz, M. 93,94
Spiers, A. S. D. 182,192
Spencer, G. R. 138
Spruch, T. 170
Srinivasa Rao, V. 58
Stanton, M. F. 128,129
Stedman, R. L. 3
Stephens, R. J. 98
Steward, D. S. 190
Stout, A. P. 71
Sugano, H. 194
Suit, H. 136
Suzuki, S. 37
Sy, W. M. 177
Szwagrzyk, E. 155
Szydlowska, H. 155

Tachibana, M. 147
Tagg, J. S. 41
Tajima, M. 120
Takagi, N. 205
Takáts, L. J. 187
Tanabe, M. 41
Tashiro, K. 147
Taurog, A. 39
Terrell, J. H. 55
Thomas, C. 85
Tiggelbeck, D. 82
Tilli, M. 59
Ting, R. C. 128,129
Tomkins, J. G. 159
Traut, M. 86
Treger, A. 67
Tritsch, G. L. 205
Tsetlin, E. M. 141
Tso, T. C. 21,74,76
Turkington, R. W. 54

Uehleke, H. 40

Vaillant, H. W. 164
Vakaet, L. 199
Valencia-Parparcen, J. 149
Vanderslice, D. 112
Van Duuren, B. L. 66
Vassilyeva, N. N. 141
Vazakas, G. E. 189
Vellisto, I. E. 180
Vickers, R. A. 214
Viola, M. V. 163
Vlahakis, G. 174
Volgadevi, P. 157

Waingrow, S. 69
Walder, J. A. 51
Walker, D. 207
Wallis, C. 140
Warda, B. 156
Weaver, N. K. 169
Webb, W. K. 47
Weikel, J. H., Jr. 47
Weinstein, E. C. 209
Weir, J. M. 158
Weiser, G. 15
Weiss, D. W. 134
Weiss, L. 110,111
Wellings, S. R. 215
Welsh, R. A. 103
Westphal, H. 114
Whang-Peng, J. 175
Wiedemann, I. 43
Wieder, R. 30
Wilson-Jones, E. 19
Winer, M. N. 23
Wogan, G. N. 30
Wynder, E. L. 76

Yancey, S. T. 92
Yasuda, D. 41
Yohn, D. S. 110,111

Zaldivar, R. 171
Zucker-Franklin, D. 102

SUBJECT INDEX

- ACETAMIDE
  - premalignant lesions, rat liver: 46
- ACETAMIDE, THIO-
  - effect on chromosomes, rat liver: 95
- ACETIC ACID, DEHYDRO-
  - effect on dimethylaminoazobenzene carcinogenesis, rat liver: 28
- ADRENAL CORTEX
  - metabolism, effect of dimethylbenzanthracene mammary carcinogenesis, rat: 61
- ADRENAL NEOPLASMS
  - epidemiology, relationship to congenital defects, child: 167
  - pheochromocytoma, with mucosal neuroma and thyroid carcinoma: 214
- AFLATOXIN B_1
  - analysis, tobacco leaf and smoke: 78
  - lung tumors, mouse: 30
- AIR
  - automobile exhaust, benzpyrene content: 56
  - chemical mutagen content, screening method (mouse): 53
  - nitrogen dioxide, lung tumors, rat: 98
- AIR POLLUTION
  - Chicago, relationship to respiratory diseases: 62
- AMINES, AROMATIC
  - detoxication, guinea pig liver: 44
- ANDROGENS
  - metabolism, rat with cadmium-induced testis tumor: 59
- ANTIOXIDANTS
  - effect on benzpyrene photodecomposition, culture media: 45
- ANTITUMOR AGENTS
  - effect on transplanted tumors, splenectomized or intact mouse: 195
  - procarbazine, carcinogenesis, rat: 92
  - tumor stimulation, mouse: 83
- APPENDECTOMY
  - and cancer incidence, Israel: 161
- ASBESTOS
  - lung cancer risk: 158
    - review: 14
- ASPHALT
  - occupational health hazard: 169
- AZOBENZENE, 4-AMINO-
  - effect on chromosomes, rat liver: 95
  - liver and other tumors, rat: 38
- AZOBENZENE, 4-AMINO-3,4'-DIMETHOXY-
  - liver and other tumors, rat: 38
- AZOBENZENE, 4-AMINO-3-METHOXY-
  - liver and other tumors, rat: 38
- AZOBENZENE, 4-DIMETHYL-3'-METHYL-
  - effect on chromosomes, rat liver: 95
- AZOBENZENE, 4-DIMETHYLAMINO-
  - effect on chromosomes, rat liver: 95
  - liver tumors, effect of dehydroacetic acid, rat: 28
    - rat: 96
- AZOBENZENE, 4-DIMETHYLAMINO-3'-METHYL-
  - liver tumors, effect of splenectomy, rat: 64
- AZOBENZENE DERIVATIVES
  - methyl-5'-quinoline analogs, liver tumors, rat: 96
  - 4-substituted, liver and other tumors, rat: 38

- BENZ(a)ANTHRACENE, 7,12-DIMETHYL-
  - effect on adrenal, relationship to mammary carcinogenesis, rat: 61
  - leukemogenesis, effect of cortisone, mouse: 48
  - mammary tumors, effect on ovary and pituitary, rat: 50
  - skin tumors, effect of vitamin A acid, rabbit: 34
    - promotion by tobacco leaf extract, mouse: 66
- 3,4-BENZO(a)PYRENE
  - analysis, automobile exhaust: 56
    - rubber dust: 57
  - effect on biliary thyroxine excretion, rat: 39
    - liver cholesterol in vitro or in vivo, rat: 41
  - photodecomposition, effect of antioxidants, culture media: 45
  - skin tumors, mouse: 60
- 3,5-BENZO(a)PYRENE
  - stomach tumors, mouse: 91
- BENZO-1:2b:4:5b-DITHIONAPHTHENE, 6,12-DIMETHYL-
  - fibrosarcoma, transplanted, effect on plasma proteins, mouse: 58
- BILIARY TRACT NEOPLASMS
  - epidemiology, Venezuela: 149
- BLADDER CARCINOGENESIS
  - 3-hydroxykynurenine, mouse: 87
- BLOOD
  - proteins, mouse with transplanted induced fibrosarcoma: 58
- BLOOD CELLS
  - granulocytes, function and ultrastructure, human: 102
  - RBC, mammary tumor virus content, naturally or artificially infected mouse: 135
- BLOOD GROUPS
  - ABO, stomach cancer: 170
- BLOOD PRESSURE
  - portal hypertension, tumor stimulation, rat: 193
- BONE NEOPLASMS
  - giant cell, simulated by pancreas carcinoma: 210
  - sarcoma, and congenital defects, child: 167
- BRAIN NEOPLASMS
  - cycasin induction, rat: 94
  - epidemiology
    - glial type, cyclic time changes: 155
    - relationship to congenital defects, child: 167
    - siblings (children), U.S.: 152
  - giant cell astrocytoma, histogenesis: 206

- BRAIN NEOPLASMS (Contd.)
  - relationship to cranial injuries, human: 15
- BREAST NEOPLASMS (See Mammary neoplasms, human)

- CADMIUM CHLORIDE
  - testis tumors, effect on androgen metabolism, rat: 59
- CALCIUM HYDROXIDE
  - effect on oral mucosa, rat: 63
- CARBON MONOXIDE
  - blood, smokers and nonsmokers, autopsy series, Los Angeles: 80
- CARBON TETRACHLORIDE
  - effect on chromosomes, rat liver: 95
- CARCINOGENS
  - aromatic amines, liver detoxication mechanism (kynurenine formamidase), guinea pig: 44
  - effect on zoxazolamine paralysis, rat: 42
  - environmental, mutagenesis, screening method (mouse): 53
  - polycyclic hydrocarbons, isolation from tobacco smoke, method: 84
    - rubber dust content: 57
  - tobacco smoke content, effect of sodium nitrate: 55
- CERVIX UTERI
  - glandular hyperplasia, contraceptives, human: 31
- CERVIX UTERI NEOPLASMS
  - epidemiology
    - Africa (Moslem and non-Moslem nations): 151
    - American Indians (New Mexico Navajo): 166
    - Barbados: 164
    - India: 165
    - Japan: 147
  - induction, 4-nitroquinoline-1-oxide, rabbit: 37
  - leukemia incidence after radiotherapy (Europe and U.S.): 20
- CHOLESTEROL
  - balance with phospholipids, relationship to tumor induction and growth, review: 11
- CHROMAFFIN TISSUE
  - possible hereditary differentiation defect with triple-tumor syndrome: 191
- CHROMOSOMES
  - acute leukemia, child: 204
  - effect of
    - carcinogenic or non-carcinogenic agents, rat: 95
    - prenatal atomic exposure (Hiroshima and Nagasaki): 25
  - exptl. tumor after prolonged *in vitro* cultivation: 197
  - human leukemia: 196
    - lymphoma and related diseases: 182
    - ovary tumor (GW-127) in hamster: 198
  - index of disease progression, human cancer or leukemia: 184,192
  - markers, familial reticulum cell sarcoma: 181
    - human cancer: 186
  - myelomonocytic leukemia with immunity disorder: 211
  - pregnant or premalignant (hyperplastic alveolar nodule) mouse mammary gland *in vitro*: 185

- CHROMOSOMES (Contd.)
  - relationship to pigment-producing enzymes, hamster melanoma: 205
- CONGENITAL DEFECTS
  - association with neuroblastoma, case and review: 177
  - and cancer incidence, child: 167
- COLON
  - ulcerative colitis, tumor incidence: 208
- COLON NEOPLASMS
  - inguinal hernia: 154
- CONNECTIVE TISSUE NEOPLASMS
  - epidemiology, siblings (children), U.S.: 152
  - induction
    - 2- or 3-acetaminoestra-1,3,5(10)-triene, mouse: 85
    - antitumor agent (procarbazine), rat: 92
    - bis(N-methylanilino)methane, rat: 89
    - bis(morpholino)methane, rat: 89
    - naphthene derivatives, plasma protein changes, mouse: 58
    - phenylnitrosourea, rat: 90
    - 4-substituted aminoazobenzenes, rat: 38
- CONTRACEPTIVES
  - cervical hyperplasia induction, human: 31
- CORPUS UTERI NEOPLASMS
  - carcinosarcoma, cystosarcoma phylloides type, histogenesis: 203
  - choriocarcinoma, epidemiology, Mexico City: 150
  - epidemiology, Africa: 151
  - hydrometra, induction, 2- or 3-acetaminoestra-1,3,5(10)-triene, mouse: 85
  - induction, antitumor agent (procarbazine), rat: 92
- CORTISONE ACETATE
  - effect on
    - dimethylbenzanthracene leukemogenesis, mouse: 48
    - Moloney virus sarcoma, mouse: 109
- CYCASIN (β-D-glucosyloxyazoxymethane)
  - kidney tumors, rat: 94
    - transplantability, rat: 93

- DIABETES MELLITUS
  - relationship to ureter cancer, human: 189
- 3,4,9,10-DIBENZPYRENE
  - sarcoma, effect of tobacco smoke extract or dibenzpyrene derivatives, mouse: 67
- 3,4,9,10-DIBENZPYRENE-5,8-QUINONE
  - antitumor effects, mouse: 67
- DIET
  - carbohydrate consumption, relationship to stomach cancer, international: 162
- DISEASE TRANSMISSION
  - owners and pets (cats or dogs) with leukemia or lymphoma: 163
  - possible, leukemia and reticulum cell sarcoma, married couples: 187

- EAR DUCT NEOPLASMS
  - induction
    - 2-acetylaminofluorene, rat: 86
    - 4-substituted aminoazobenzenes, rat: 38

SUBJECT INDEX

- ENDOCRINE ABLATION
  - effect on mammary gland, mouse: 215
- ENVIRONMENTAL HEALTH HAZARDS
  - method of detection (mutagenesis, mice): 53
- ENZYMES
  - kynurenine formamidase, detoxication of aromatic amine carcinogens, guinea pig liver: 44
  - phospholipase C, effect on Shope fibroma virus, normal cells: 117
  - pigment-producing, relationship to chromosome morphology, hamster melanoma: 205
  - RNA polymerase, effect of Friend leukemia virus, mouse spleen: 124
- EPIDEMIOLOGY
  - Africa: 151
  - American Indians (New Mexico): 166
  - Barbados: 164
  - Britain (South London): 159
  - Hungary, rural: 146
  - international: 162
  - Japan: 147
  - Mexico City: 150
  - mouth cancer, review: 2
  - Poland (Warsaw and rural): 156
  - Scotland: 148
  - spontaneous tumors, beagle: 171
  - U.S.
    - California, Mexican immigrant women: 32
      - occupational groups: 158
    - children: 152,168
    - South Florida: 160
  - Venezuela: 149
- ESTRA-1,3,5(10)-TRIENE
  - 2- or 3-acetamino-, carcinogenesis, mouse: 85
  - 2-acetylamino-, carcinogenesis, rat: 86
  - 3-amino-, carcinogenesis, rat: 86
- ESTRA-1,3,5(10)-TRIENOL-17β, 3-AMINO-
  - carcinogenesis, mouse or rat: 85
- ESTROGENS
  - effect on
    - gene expression, chick oviduct: 99
    - mammary and other tumor incidence, rat: 47
  - mammary tumor DNA response as index of growth rate, mouse: 54
- ESTRUS CYCLE
  - effect of pituitary graft, agent-positive or agent-free mouse: 179

- FLUORANTHENE
  - analysis, rubber dust: 57
- FLUORENE, 2-ACETYLAMINO-
  - liver tumors, liver, rat: 33,86
- FLUORENE, 2-AMINO-N-HYDROXY-
  - metabolism, guinea pig: 43
- FLUORENE, 2-AMINO-N-NITROSO-
  - metabolism, guinea pig: 43
- FREE RADICALS
  - analysis, tobacco smoke, possible relationship to tobacco carcinogenesis: 77

- GALLBLADDER NEOPLASMS
  - liver metastases and paraneoplastic lanugo-type hypertrichosis, case and review: 202
- GASTROINTESTINAL CARCINOGENESIS
  - antitumor agent (procarbazine), rat: 92
  - benzpyrene, mouse: 91
  - cycasin, rat: 94
  - 2-nitrosofluorene, rat: 86
  - nitrosourethan derivatives, rat: 49
- GASTROINTESTINAL NEOPLASMS
  - epidemiology, Venezuela: 149
  - familial, review: 172
- GENETICS, ANIMAL
  - cellular gene expression, effect of estrogen, chick oviduct: 99
  - characteristics of high hepatoma and mammary tumor mouse strain: 174
  - relationship to mammary virus tumor growth, mouse: 118,173
    - virus leukemogenesis, chick embryo: 125
- GENETICS, HUMAN
  - familial
    - childhood cancer, siblings, U.S.: 152
    - g.i. cancer, review: 172
    - hepatoma, 3 siblings: 183
    - lymphoma (3 generations), chromosome markers in 1 case: 181
  - hereditary disorders
    - chromaffin differentiation defect with multiple-tumor syndrome: 191
    - relationship to cancer incidence, child: 167
- GENITAL NEOPLASMS
  - female, epidemiology, regional differences, Africa: 151
  - gonadoblastoma, epidemiology, relationship to congenital defects, child: 167
- GOLD
  - jewelry, radon-contaminated, skin carcinoma, human: 23

- HEAD AND NECK NEOPLASMS
  - sphenoid sinus carcinoma, radiation induction: 24
- HERNIA, INGUINAL
  - relationship to colon cancer: 154
- HYDROXYLAMINE, N-ACETYL-N-(3-ESTRA-1,3,5(10)-TRIENYL)-
  - carcinogenesis, rat: 86

- IMMUNITY
  - antibody formation to non-tumor viruses, mouse with virus leukemia: 108
  - antigen production, exptl. tumor after prolonged *in vitro* cultivation: 197
    - human ovary tumor (GW-127) in hamster: 198
  - bovine papilloma virus, horse with equine sarcoid: 138
  - leukemia viruses, mouse: 105,123
  - mammary tumor virus, mouse: 134
  - rat-mouse heterospecific chimera, determination of leukemia virus: 106
  - tolerance induction by ascites, animal and human: 212
  - virus-induced sarcoma, mouse: 128

UNITY DISORDERS
  congenital or hereditary, relationship to cancer incidence, child: 167
  myelomonocytic leukemia with chromosome abnormalities: 211
URY
  chronic irritation, mouth cancer, review: 2
  cranial, brain tumors, human: 15
ULIN
  mammary tumor DNA response as index of growth rate, mouse: 54
ESTINAL NEOPLASMS
  induction
    antitumor agent (procarbazine), rat: 92
    cycasin, rat: 94
    2-nitrosofluorene, rat: 86
    nitrosourethan derivatives, rat: 49

NEY CARCINOGENESIS
  antitumor agent (procarbazine), rat: 92
  cycasin, rat: 93,94
  dimethylnitrosamine, rat: 88
NEY NEOPLASMS
  mixed carcinoma, histogenesis: 207
  ilms', epidemiology, relationship to congenital defects, child: 167
URENINE, 3-HYDROXY-
  eukemogenesis and carcinogenesis, mouse: 87

YNX NEOPLASMS
  ossible complication of interstitial cell pneumonia, heavy smoker: 190
EMIA, HUMAN
  hromosome morphology: 184,192,196,204
  hronic
    basophilic, with tuberculosis, blood histamine elevation and asthma: 213
    lymphatic, with reticulum cell sarcoma in spouse: 187
  pidemiology
    and congenital defects, child: 167
    India, viral study: 157
    siblings (children), U.S.: 152
  ymphoblastic (children) or myeloid (adult), relationship to lymphosarcoma or myeloma in pet dogs: 163
  yelomonocytic, with immunity disorder and chromosome abnormality: 211
EMOGENESIS (See also Virus, leukemia/lymphoma)
  ntitumor agent (procarbazine), rat: 92
  vian leukosis virus, effect of host genotype, chick embryo: 125
  imethylbenzanthracene, effect of cortisone, mouse: 48
  stratriene derivatives, mouse: 85
  -hydroxykynurenine, mouse: 87
  adiation, cervix cancer (Europe and U.S.): 20
R
  holesterol, effect of carcinogens, rat: 41
  hromosomes, effect of carcinogenic or non-carcinogenic agents, rat: 95
  irrhosis, relationship to mouth cancer, occupational groups, California: 158

LIVER (Contd.)
  enzymatic detoxication of aromatic amine carcinogens, guinea pig: 44
  nucleoli, effect of dimethylnitrosamine, mouse: 29
  portal hypertension, tumor stimulation, rat: 193
  thyroxine metabolism, effect of benzpyrene, rat: 39
LIVER CARCINOGENESIS
  acetamide, premalignant, rat: 46
  acetylaminofluorene, rat: 33,86
  aminoazobenzene derivatives, rat: 28,38,64, 96
  cycasin, rat: 94
  diethylnitrosamine, premalignant, protein and -SH levels, rat: 51
    properties of cell line, monkey: 175
  dimethylaminoazobenzene, effect of dehydroacetic acid, rat: 28
    methyl-5'-quinoline analogs, rat: 96
  methylcholanthrene, premalignant, protein and -SH levels, rat: 51
  methyldimethylaminoazobenzene, effect of splenectomy, rat: 64
  2-nitrosofluorene, rat: 86
LIVER NEOPLASMS
  epidemiology
    child (U.S.): 168
    congenital defects: 167
    Venezuela: 149
  hepatoma, hereditary, with hereditary mammary tumor, strain characteristics, mouse: 174
    "minimal-deviation" type, nucleolar RNA content, rat: 194
    siblings: 183
  incidence, effect of parity, 5 generations of agent-free mice: 180
LUNG
  bioassay, rubber dust, monkey: 57
  interstitial cell pneumonia, larynx cancer as possible complication, heavy smoker: 190
LUNG CARCINOGENESIS
  aflatoxin B_1, mouse: 30
  antitumor agent (procarbazine), rat: 92
  cycasin, rat: 94
  nitrogen dioxide, rat: 98
  4-nitroquinoline-1-oxide, rabbit: 37
LUNG NEOPLASMS
  associated atypical epithelial proliferation and fibrosing alveolitis, pathology: 200
  epidemiology, Britain (South London): 159
  occupational risk, California union members: 158
  relationship to asbestos exposure, California: 158
    review: 14
  smoking
    filtered or unfiltered cigarettes, hospital group (New York): 70
    Mexican immigrant women, California: 32
    mortality, U.S. men: 68
    review (book): 1
  spontaneous, effect of tobacco smoke extract, mouse: 67

SUBJECT INDEX

- LYMPHOMA, MALIGNANT
  - epidemiology, relationship to congenital defects, child: 167
  - familial, chromosome morphology: 181
  - human, growth rate determination, method: 176
    - chromosome morphology: 182
  - induction, antitumor agent (procarbazine), rat: 92
  - NK/Ly, stimulation by antitumor agents, mouse: 83
  - radiation-induced mycosis fungoides, terminal reticulum cell sarcoma: 18
- LYMPHOSARCOMA
  - cat or dog, relationship to leukemia or lymphoma in owners (adults or children): 163

- MAMMARY CARCINOGENESIS (EXPERIMENTAL) (See also under Virus, mammary tumor)
  - antitumor agent (procarbazine), rat: 92
  - dimethylbenzanthracene, benign or malignant, ovary and pituitary function, rat: 50
    - relationship to adrenal metabolism, rat: 61
  - estratriene derivatives, mouse or rat: 85
  - 3-hydroxykynurenine, mouse: 87
- MAMMARY GLAND
  - effect of pituitary graft, agent-positive or agent-free mouse: 179
  - hyperplastic alveolar nodules, chromosome morphology *in vitro*, mouse: 185
    - effect of mammary tumor virus, mouse: 137
    - *in vitro* viability, mouse: 178
  - mammary tumor virus propagation after mastectomy, mouse: 133
  - organ culture and transplantation, mouse: 216
  - secretion, effect of endocrine ablation, mouse: 215
- MAMMARY NEOPLASMS (EXPERIMENTAL)
  - DNA response to estrogen or insulin as index of growth rate, mouse: 54
  - hereditary, agent-positive or agent-free mouse: 173
    - with hereditary hepatoma, strain characteristics, mouse: 174
  - incidence, effect of parity, 5 generations of agent-free mice: 180
  - spontaneous, incidence, effect of estrogens, rat: 47
  - virus-induced, pathology, mouse: 130
    - relationship to host genetics, mouse: 118
- MAMMARY NEOPLASMS (HUMAN)
  - clear cell hidradenoma, morphogenesis: 201
  - epidemiology
    - Africa: 151
    - Poland (Warsaw and rural): 156
  - thyroid hypofunction, review: 5
  - virus-like particles: 131
- MESENTERIC NEOPLASMS
  - incidence, effect of parity, agent-free mice: 180
- METHANE, BIS(N-METHYLANILINO)-
  - connective tissue tumors, rat: 89
- METHANE, BIS(MORPHOLINO)-
  - connective tissue tumors, rat: 89
- 3-METHYLCHOLANTHRENE
  - effect on liver cholesterol *in vitro* or *in vivo*, rat: 41
  - skin tumors, mouse: 60
  - transformed hamster embryonic cells, effect of tumor viruses: 115
- 20-METHYLCHOLANTHRENE
  - liver, premalignant lesions, protein and -SH levels, rat: 51
- MOUTH
  - epithelium, DNA-dependent dye binding, smokers and nonsmokers: 52
  - mucosa, effect of calcium hydroxide, rat: 63
- MOUTH NEOPLASMS
  - epidemiology
    - relationship to chronic irritation and intrinsic factors, review: 2
      - liver cirrhosis, occupational groups, California: 158
  - etiology, review: 12
- MUTAGENESIS
  - screening of environmental chemicals, method, mouse: 53
- MYELOMA, MULTIPLE
  - dog, relationship to myeloid leukemia in owner: 163

- 2-NAPHTHYLAMINE
  - metabolism, effect of phenobarbital, dog: 40
- NEOPLASMS (general and unspecified)
  - mechanism of malignant transformation, review: 10
  - phospholipid and cholesterol metabolism, review: 11
- NEOPLASMS, EXPERIMENTAL (general and unspecified)
  - ascites, immune tolerance induction: 212
  - Ehrlich carcinoma (mouse), antigen composition and karyotype after prolonged *in vitro* cultivation: 197
    - effect of antitumor agents or splenectomy: 195
  - HeLa cells, transplantation, chick embryo: 199
  - spontaneous, epidemiology, beagle: 171
  - Walker 256 carcinosarcoma (rat), stimulation, portal hypertension: 193
- NEOPLASMS, HUMAN (general and unspecified)
  - ascites, immune tolerance induction: 212
  - chromosome markers: 186
    - morphology as index of disease progression: 184
  - embryonic structures, thyroglossal duct adenocarcinoma, case and review: 188
  - epidemiology, Hungary, rural: 146
    - occupational, California: 158
    - relationship to appendectomy, Israel: 161
      - ulcerative colitis: 208
  - multiple (thyroid cancer + pheochromocytoma + neuroma or neurofibromatosis), etiology: 191,214
- NEUROBLASTOMA
  - association with congenital defects, case (infant) and review: 177

UROFIBROMATOSIS
  with pheochromocytoma and thyroid cancer, possible hereditary chromaffin differentiation defect: 191,214
TRATES
  alkaline, effect on carcinogen content of tobacco smoke: 55
      tobacco smoke carcinogenicity, mouse skin: 76
TROGEN DIOXIDE
  lung tumors, rat: 98
TROSAMINE DERIVATIVES
  analysis, tobacco smoke, review: 8
TROSAMINE, DIETHYL-
  liver, premalignant lesions, protein and -SH levels, rat: 51
      tumor, cell line, monkey: 175
TROSAMINE, DIMETHYL-
  effect on nucleolus, mouse liver: 29
  kidney tumors, rat: 88
NITROQUINOLINE-1-OXIDE
  derivatives, 3- and 8-substituted, chemistry: 97
  lung tumors, rabbit: 37
TROSOBENZENE
  metabolism, guinea pig: 43
TROSODIETHYLAMINE (See Nitrosamine, diethyl-)
NITROSOFLUORENE
  metabolism, guinea pig: 43
  skin or g.i. tumors, rat: 86
NITROSOFLUORENE, 2-AMINO-
  metabolism, guinea pig: 43
TROSOUREA, PHENYL-
  connective tissue tumors, rat: 90
NITROSOURETHAN, N-METHYL- OR N-ETHYL-
  intestinal tumors, rat: 49
CLEIC ACIDS, DNA
  binding to capsid proteins of adenovirus-5, tumor (KB) cells: 143
  dye binding, oral epithelium, smokers and nonsmokers: 52
  effect of
      Friend leukemia virus, mouse spleen: 124
      urethan, cell-free system: 36
          in vivo, mouse: 35
  index of tumor growth rate, human lymphoma: 176
      mouse mammary tumor: 54
  tumor virus-transformed cells: 114
CLEIC ACIDS, RNA
  effect of
      estrogen, chick oviduct: 99
      leukemia virus, mouse spleen: 124
      urethan, cell-free system: 36
          in vivo, mouse: 35
  mengovirus-infected normal or tumor cells: 144
  nucleolar, "minimal-deviation" rat hepatoma: 194
  tumor virus-transformed cells: 114

CUPATIONAL DISEASES
  asbestos exposure, lung cancer risk, review: 14
  cancer risk, California union members: 158

OCCUPATIONAL DISEASES (Contd.)
  cancer risk (Contd.)
      petroleum asphalt workers: 169
OVARIAN NEOPLASMS
  epidemiology, regional differences, Africa: 151
  human cell line (GW-127) karyotype and antigen production, hamster: 198
      mechanism of adaptation to hamster, review: 13
  induction, estratriene derivatives, mouse: 85
OVARY
  function, rat with benign or malignant induced mammary tumor: 50

PANCREAS NEOPLASMS
  carcinoma, simulating giant cell bone tumor: 210
  with chronic pancreatitis: 209
  induction, 3-hydroxykynurenine, mouse: 87
PARANEOPLASTIC SYNDROMES
  lanugo-type hypertrichosis, gallbladder cancer with liver metastases, case and review: 202
PHENOBARBITAL
  effect on naphthylamine metabolism, dog: 40
PHEOCHROMOCYTOMA
  with neurofibromatosis and thyroid cancer, possible hereditary chromaffin differentiation defect: 191,214
PHOSPHOLIPIDS
  balance with cholesterol, relationship to tumor induction and growth, review: 11
PITUITARY
  function, rat with benign or malignant induced mammary tumor: 50
  isograft, effect on mammary gland and estrus cycle, agent-positive or agent-free mouse: 179
PLASMA CELL TUMOR
  foster-nursed mouse, mammary tumor virus content: 132
  stimulation by antitumor agents, mouse: 83
PLASMACYTOMA
  respiratory tract, epidemiology, Scotland (Aberdeen area): 148
PLEURAL NEOPLASMS
  mesothelioma, relationship to asbestos exposure, review: 14
POLYMERS
  cationic, effect on SV-15 adenovirus *in vitro*: 140
PREGNANCY
  mammary gland chromosomes *in vitro*, mouse: 185
  multiparity, effect on tumor incidence, 5 generations of agent-free mice: 180
PROTEINS
  synthesis, mengovirus-infected normal or tumor cells: 144
PYRENE
  analysis, rubber dust: 57

RADIATION
  atomic, prenatal exposure (Hiroshima and Nagasaki), effect on WBC chromosomes: 25

RADIATION (Contd.)
- damage, effect of sulfur mustard, normal cells: 26
- effect on growth cycle, normal cells: 16,17
  - mammary tumor, agent-positive or agent-free mouse: 136

RADIATION CARCINOGENESIS
- leukemia after cervix cancer radiotherapy, Europe and U.S.: 20
- radium salts, sphenoid sinus carcinoma: 24
- skin, radon-contaminated gold ring: 23
  - solar exposure, South Florida: 160
    - tumor development on vaccination scar: 19
- ^{232}Th (Thorotrast), mycosis fungoides and terminal reticulum cell sarcoma: 18

RADIOISOTOPES
- ^{210}Po, analysis, American tobacco: 21
  - toxicity, review: 9
- ^{226}Ra, analysis, American tobacco: 21
  - water supplies, U.S. (Midwest, Southwest, New England, Alaska, Hawaii): 22

RESPIRATORY TRACT
- epithelium, effect of tobacco smoke, dog or cat: 71,72
- toxicity, ^{210}Po, review: 9
  - tobacco smoke, aerosol and volatile constituents, review: 7

RESPIRATORY TRACT DISEASES
- relationship to air pollution, Chicago: 62

RESPIRATORY TRACT NEOPLASMS
- plasmacytoma, epidemiology, Scotland (Aberdeen area): 148

RETICULUM CELL SARCOMA
- familial, chromosome markers: 181
- induction, estratriene derivatives, mouse: 85
- radiation-induced, terminal stage of mycosis fungoides: 18
- transmission, pets and their owners: 163
  - spouses: 187

RUBBER
- dust, polycyclic hydrocarbons, chemical analysis and monkey lung bioassay: 57

SALIVARY GLAND NEOPLASMS
- mixed type, possible polyoma-like virus induction, human: 103

SARCOID, EQUINE
- immunity to bovine papilloma virus, horse: 138

SARCOMA
- #180 (mouse), effect of antitumor agents or splenectomy: 195
    - dibenzpyrene quinone: 67
  - stimulation by antitumor agents: 83
- incidence, effect of parity, 5 generations of agent-free mice: 180
- induction, dibenzpyrene, effect of tobacco smoke extract or dibenzpyrene derivatives, mouse: 67
  - 3-hydroxykynurenine, mouse: 87
- virus-induced, pathology, mouse: 129

SCAR TISSUE
- burns, skin cancer, human: 27
- vaccination, skin cancer, and sun exposure, human: 19

SEX FACTORS
- male:female ratio, stomach cancer, international: 162

SKIN CARCINOGENESIS
- antitumor agent (procarbazine), rat: 92
- benzpyrene, mouse: 60
- burn scars, human: 27
- dimethylbenzanthracene, effect of vitamin A acid, rabbit: 34
- estratriene derivatives, mouse: 85
- methylcholanthrene, mouse: 60
- 2-nitrosofluorene, rat: 86
- radon-contaminated gold ring, human: 23
- tobacco smoke, dose-response relationship, mouse, review: 6
  - effect of additives, mouse: 66,76

SKIN NEOPLASMS
- melanoma, relationship of pigment-producing enzymes to karyotype, hamster: 205
- neuroma, with pheochromocytoma and thyroid carcinoma: 191,214
- relationship to solar exposure, South Florida: 160
    - tumor on vaccination scar: 19

SPINAL CORD NEOPLASMS
- primary or metastatic, incidence, Mississippi (hospital population): 153

SPLEEN
- mammary tumor virus propagation, mastectomized mouse: 133

SPLEEN CARCINOGENESIS
- aminoazobenzene derivatives, rat: 38
- antitumor agent (procarbazine), rat: 92

SPLENECTOMY
- effect on
  - methyldimethylaminoazobenzene carcinogenesis, rat liver: 64
  - transplanted tumors, mouse: 195

STOMACH NEOPLASMS
- epidemiology
  - relationship to ABO blood groups, human: 170
  - sex ratio, international: 162
  - Venezuela: 149
- forestomach, induction, benzpyrene, mouse: 91
    - 2-nitrosofluorene, rat: 86

SULFUR MUSTARD
- effect on
  - growth cycle, normal cells: 16,17
  - radiation damage, normal cells: 26

SV40 (See under Virus, adeno-)

TESTIS NEOPLASMS
- cadmium-induced, effect on androgen metabolism, rat: 59

THYROID
- hypofunction, relationship to breast cancer, review: 5

THYROID NEOPLASMS
- carcinoma, with pheochromocytoma and neuroma or neurofibromatosis, etiology: 191,214
- induction, 3-hydroxykynurenine, mouse: 87

THYROXINE
- biliary excretion, effect of benzpyrene, rat: 39

BACCO
- genetics and farming or curing methods, effect on tar and nicotine content of smoke, U.S.: 74
- leaf, analysis, aflatoxin: 78
  - ^{210}Po and ^{226}Ra: 21
  - tar content of smoke: 75
- leaf extract, promotion of DMBA skin carcinogenesis, mouse: 66
- proposed standards for cigarettes: 65
- reconstituted, tar content of smoke: 75

BACCO SMOKE
- analysis
  - aflatoxin: 78
  - gas phase: 79
  - nitrosamine, review: 8
  - ^{210}Po, review: 9
  - tar: 76
    - reconstituted and natural-leaf tobacco: 75
- constituents
  - carcinogens, effect of sodium nitrate: 55
  - free radicals, possible relationship to carcinogenesis: 77
  - polycyclic hydrocarbons, isolation method: 84
  - tar, relationship to cigarette consumption, U.S.: 69
    - and nicotine, variation by genetics, curing and farming methods, U.S.: 74
- filtration: 73,81,82
  - mechanisms, review: 4
  - nicotine reduction, review: 3
- nicotine-free extracts, effect on spontaneous or benzpyrene-induced tumors, mouse: 67
- respiratory toxicity, dog or cat: 71,72
  - role of aerosol and volatile constituents, review: 7
- skin carcinogenesis
  - dose-response relationship, mouse, review: 6
  - effect of additives, mouse: 66,76

BACCO SMOKING
- blood carbon monoxide, smokers and nonsmokers, autopsy series, Los Angeles: 80
- effect on DNA-dependent dye binding by oral epithelium, human: 52
- interstitial cell pneumonia, larynx cancer as possible complication: 190
- lung cancer
  - Britain (South London): 159
  - California: 158
  - and heart disease, U.S. men: 68
  - Mexican immigrant women, California: 32
  - review (book): 1
  - smokers of filtered or unfiltered cigarettes, hospital population (New York): 70
- relationship of cigarette consumption to tar rating, U.S.: 69

ETER NEOPLASMS
- relationship to diabetes, human: 189

ETHAN
- effect on DNA and RNA, cell-free system: 36
  - mouse: 35

URETHAN DERIVATIVES
- nitroso, intestinal tumors, rat: 49

UTERUS NEOPLASMS (See under Corpus uteri)

VIRUS
- avian tumor, ultrastructure and cytochemistry of aberrant forms: 121
- bovine papilloma, immunity, horses with equine sarcoid: 138
  - morphology: 120
- deer fibroma, morphology: 120
- measles, tumor induction after in vitro propagation, hamster: 145
- particles resembling, structure and function, human granulocytes: 102
- polyoma, transformation in vitro, mechanism: 114
- Shope fibroma, assay, inclusion body count, normal and tumor cells: 116
  - effect of phospholipase and actinomycin, normal cells: 117
- vaccinia, skin tumor development on vaccination scar, relationship to sun exposure: 19

VIRUS, ADENO
- human, growth in monkey kidney cells: 112
- replication, human embryo kidney cells: 139
- SA-7 (monkey) and type 2 (human), properties of hybrid: 141
  - and type 12 (human), transformation, hamster embryo cells: 142
- SV-15, effect of cationic polymers in vitro: 140
- SV40
  - defective or monkey cell-adapted, replication, human embryo kidney cells: 139
  - effect on methylcholanthrene-transformed hamster embryo cells: 115
  - transformation, hamster embryo cells: 113
    - mechanism: 114
- type 5, capsid proteins, DNA binding, tumor cells: 143
- type 7, effect on methylcholanthrene-transformed hamster embryo cells: 115
- type 12, comparison of virus- and virus-infected cell-induced tumors, hamster: 110,111

VIRUS CARCINOGENESIS (general and unspecified)
- polyoma-like virus, human mixed salivary gland tumors: 103

VIRUS, LEUKEMIA/LYMPHOMA (See also under Leukemogenesis)
- attempted isolation, owners and pets with leukemia or lymphoma: 163
- avian leukosis, strain differences in response, chick embryo: 125
- Burkitt lymphoma, immunofluorescence, normal or tumor cells: 101
  - review: 100
- classification, mouse: 107
- Friend
  - cross-resistance, mouse: 105
  - determination, rat-mouse heterospecific chimera: 106

VIRUS, LEUKEMIA/LYMPHOMA (Contd.)
  Friend (Contd.)
    effect on RNA polymerase, infected mouse spleen: 124
    immunosuppression, mouse: 123
    interaction with non-tumor viruses, mouse: 108
    structure and leukemogenic activity, mouse: 122
  Gross, cross-resistance, mouse: 105
  helper activity for mouse sarcoma virus _in vitro_: 127
  human, isolation and mouse bioassay: 157
  Moloney, cross-resistance, mouse: 105
  mouse erythroblastosis, long-term _in vitro_ propagation: 126
  Rauscher
    cross-resistance, mouse: 105
    immunosuppression, mouse: 123
    interaction with non-tumor viruses, mouse: 108
  thymic and lymph node reticulum cells, mouse: 104
VIRUS, MAMMARY TUMOR (See also under Mammary neoplasms)
  effect on
    radiation-induced tumors, mouse: 136
    systemic response to pituitary graft, mouse: 179
    virus-free mammary nodules, mouse: 137
  host genetics, mouse: 118,173,180
  interaction with specific antibodies, mouse: 134

VIRUS, MAMMARY TUMOR (Contd.)
  morphology, mouse milk: 130
    plasma cell tumors, foster-nursed mice: 132
    RBC, naturally or artificially infected mouse: 135
  particles resembling, human breast cancer: 131
  production and identification _in vitro_: 119, 133
VIRUS, SARCOMA
  effect on immune mechanism, mouse: 128
  helper activity of mouse leukemia virus _in vitro_: 127
  Moloney, effect of cortisone, mouse: 109
  tumor pathology, mouse: 129
VITAMIN A ACID
  effect on dimethylbenzanthracene carcinogenesis, rabbit skin: 34

WATER
  analysis, chemical mutagens, mouse bioassay: 53
    ^{226}Ra, U.S. (Midwest, Southwest, New England, Alaska, Hawaii): 22

ZOXAZOLAMINE
  paralysis, effect of carcinogens, rat: 42

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF H.E.W.

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

.99405
CAR

Vet. Med

VETERINARY MEDICINE
LIBRARY

FEBRUARY 1969
Abstract Nos. 217-441

Vol. 7
No. 2

CARCINOGENESIS ABSTRACTS

UNIVERSITY OF ILLINOIS
OCT 27 1969
LIBRARY

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

CARCINOGENESIS ABSTRACTS

Volume 7, Number 2
February, 1969

(Submitted for Publication
November, 1968)

Abstract Numbers
217-441

CONTENTS

	Page
Review	43
Physical Carcinogenesis	47
Chemical Carcinogenesis	49
Viral Carcinogenesis	70
Epidemiology and Biometry	77
Miscellaneous	86
Author Index	i
Subject Index	iv

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Pursuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a national program of cooperative research in cancer, is establishing a means whereby information in the field of carcinogenesis will be coordinated and made available. The information to be included will be obtained from the National Cancer Institute, other governmental agencies, and non-governmental research institutions.

The issuing of *Carcinogenesis Abstracts* under the auspices of the National Cancer Institute will provide a central source for current abstracting of the carcinogenesis literature being published throughout the world. This will help facilitate an integrated and cooperative program of investigation in this area. The growing number of publications in the area of carcinogenesis makes imperative the availability of an appropriate abstracting service so that investigators may be apprised of progress with a minimum of delay. It is our desire to provide the investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most recently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. If the journal is not covered by *Index Medicus*, then the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

admin.	administered, administration	mg	milligram(s)
av.	average	min.	minute(s)
C	curie(s)	ml	milliliter(s)
mC	millicurie(s)	mm	millimeter(s)
µC	microcurie(s)	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
conc.	concentration	NIH	National Institutes of Health, USA
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	QO_2	oxygen quotient
DNase	deoxyribonuclease	PFU	plaque forming unit
e.g.	for example	ppm	parts per million
FFU	focus forming unit	pt.(s)	patient(s)
g.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
g	gram(s)	RES	reticuloendothelial system
µg	microgram(s)	resp.	respectively
Hb	hemoglobin	RNA	ribonucleic acid
i.a.	intra-arterial	RNase	ribonuclease
ID_{50}	median infectious dose	soln.	solution
inj.	injected, injection(s)	s.c.	subcutaneous
inoc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
i.p.	intraperitoneal	x	times (e.g. x 3/wk.)
I.U.	international unit(s)	U	unit
i.v.	intravenous	UV	ultraviolet
kg	kilogram(s)	vol.	volume
LD_{50}	median lethal dose	VA	Veterans Administration
M	molar, mole(s)	wt.	weight
mM	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
µM	micromole(s)		
max.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

Af.	Afrikaans	E.	English	Hun.	Hungarian	Lith.	Lithuanian	Ser.	Serbo-Croatian
Ar.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
Bul.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
Ch.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
Cz.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
Dan.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
Dut.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

69-217 TUMOR-SPECIFIC ANTIGENS OF PUTATIVELY NONVIRAL TUMORS. (E.) Prehn, R. T. (Inst. Cancer Res., Philadelphia, Pa.). Cancer Res. 28(7):1326-1330, 1968.

Several studies of the immune mechanism and its relationship to very early chemically induced premalignant lesions (syngeneic grafts of carcinogen-treated skin in BCG-treated, irradiated or thymectomized mice; classical immunization-challenge experiments in mice with transplanted hyperplastic mammary nodules) are discussed. It is suggested that the variation in tumor-specific antigen titer is related to the latent period and the host's reactivity and probably results from immunoselection ("usurpation" by tumor antigens of part of the cell surface, which then fails to function in normal regulation). The antigens develop in early premalignant lesions; the host immune defenses suppress many of these lesions before they grow or become malignant. (44 references)

69-218 GEOCHEMICAL ASPECTS OF THE EPIDEMIOLOGY OF MALIGNANT TUMORS (METHODS OF STUDY). (Rus.) Dvoirin, V. V. (Karel'ski Cancer Hosp., Petrozarodsk, Kazakhstan SSR). Vop. Onkol. 14(5):105-110, 1968.

The differences in the distribution of microelements (ME), the specificity of mineral metabolism in cancer pts. and the geographical variations in cancer incidence suggest a correlation between cancer epidemiology and the geochemical characteristics of the environment. It is suggested that geochemical maps of environmental ME distribution (soil, water, plants and local foods), compared to cancer morbidity maps, may be useful in determining the role of ME intake (particularly in foods) in the epidemiology of malignant diseases. (31 references)

69-219 Diagnostic Cytology and its Histopathologic Bases. Koss, L. G. Publ.: J. B. Lippincott Co., Philadelphia, 1968, pp. 653.

The cytodiagnosis of tumors of the female genital organs, respiratory tract, urinary tract, mouth and pharynx, malignant effusions and the g.i. tract is reviewed.

69-220 THE HISTOCOMPATIBILITY SYSTEMS AND SUSCEPTIBILITY TO CANCER. (Fr.) Dausset, J. (St. Louis Hosp., Paris). Presse Med. 76(28):1397-1400, 1968.

The relationship between the histocompatibility H-2) system and sensitivity to virus-induced eukemia or mammary tumors in mice depends on numerous factors, including the age, hormonal tatus and immune defenses of the host, as well as the virus dose. The human histocompatibility system (HL-A) may also play a role in tumor development, including familial leukemogenesis and hereditary or familial malignant diseases (colon polyposis, xeroderma pigmentosum, neurofibromatosis, retinoblastoma, etc.). It is suggested that the extreme polymorphism of the HL-A system (which may act at the time of viral penetration or by subsequent immune reactions against the virus or viral antigens) results from a defense mechanism against viruses and other "foreign bodies," which may contain membrane antigens from 1 or more previous hosts in the particle envelopes. (14 references)

69-221 THEORIES OF CARCINOGENESIS. (Nor.) Iversen, O. H. T. Norske Laegeforen. 88(12):1173-1179, 1968.

Possible mechanisms of tumor induction by radiation, chemicals and viruses including their actions at the subcellular level (on DNA, RNA, mitochondrial enzymes, etc.) and immunosuppressive effects are discussed. (29 references)

69-222 IONIZING AGENTS AND TUMOR DEVELOPMENT. (Nor.) Devik, F. T. Norske Laegeforen. 88(12):1194-1199, 1968.

Previously published studies of radiation carcinogenesis in man (radiation-induced skin cancer; leukemia after radiotherapy of ankylosing spondylitis; leukemia in Hiroshima and Nagasaki; childhood cancer after prenatal radiation exposure; cancer in radiologists and other professional personnel; lung cancer in radium miners) are discussed and compared to results obtained in animals (usually mice). (29 references)

69-223 MECHANISM OF ACTION OF THE NITROSAMINES. (Nor.) Elgjo, K. M. T. Norske Laegeforen. 88(12):1228-1231, 1968.

Alkylation of DNA by the nitrosamines (specifically, DNA guanine) is suggested as the basic mechanism of carcinogenesis; this reaction may lead to alteration of the 3-dimensional structure of the DNA template, alteration of its histone "cap" or disturbances of the subsequent interaction of DNA with messenger RNA. (13 references)

69-224 EXPERIMENTAL LIVER CARCINOGENESIS. (Nor.) Fritzon, P. T. Norske Laegeforen. 88(12):1239-1246, 1968.

The mechanisms of liver carcinogenesis by fluorenes (which are bound to RNA) and azo dyes (bound to DNA and proteins) are discussed on the basis of a literature survey. The author's studies in premalignant lesions induced by 2-acetylaminofluorene in rat liver showed a reduction of catabolic enzymes (the dephosphorylating activity of ribonucleotidase) and an increase in anabolic enzymes (aspartate transcarbamylase, deoxycytidylic acid deaminase, deoxythymidylic acid kinase) during treatment, with normalization of these enzymes after treatment was stopped. (16 references)

69-225 HORMONAL MECHANISMS IN THE DEVELOPMENT OF TUMORS. (Nor.) Attramadal, A. T. Norske Laegeforen. 88(12):1205-1210, 1968.

Most of the paper is a discussion of the mechanism(s) of estrogen (E) dependence of mammary and uterine tumors in mice and rats. In some reported studies of animals with methylcholanthrene- or dimethylbenzanthracene-induced mammary tumors (E-dependent), patterns of RNA and protein metabolism suggested competition between E and the carcinogens in the metabolic cycles of target organ cells. (66 references)

69-226 IRRITANTS, CONSTITUTION, RESPONSE. (Nor.) Kreyberg, L. T. Norske Laegeforen. 88(12):1180-1187, 1968.

Previously published studies of interstrain differences in the response of mice (strains RL, WLO and DBA) to chemical carcinogens (designated "Saxolin," "Tyssfjord" and B.10) are summarized. (8 references)

69-227 CARCINOGENS IN THE ENVIRONMENT: HUMAN EVIDENCE. (E.) Doll, R. (University Coll. Hosp., London). T. Norske Laegeforen. 88(12):1187-1194, 1968.

Radiation exposure at high dose levels is a known human carcinogen, but the levels of background environmental radiation are probably too low (about 0.1 rad/yr.) to influence the incidence of many tumors, with the possible exception of about 10% of leukemias in young adults. An exception is UV exposure from sunlight, associated with skin cancer. The relationship between air pollution by carcinogenic hydrocarbons and the incidence of lung cancer suggests that air pollution may act synergistically with smoking; it may contribute to 50% of lung cancers at most, probably much less. Occupational exposure to asbestos is associated with pleural mesothelioma and possibly bronchial carcinoma; other possible occupational carcinogens include nickel, chromates, inorganic arsenic, β-naphthylamine and benzene. The incidence of bladder carcinoma and cholangiocarcinoma of the liver is high in areas where *Schistosoma haematobium* and *Clonorchis sinensis*, resp., are endemic. Stomach cancer may be associated with areas where the zinc/copper ratio in the soil is low and/or the water supply is soft. Personal factors associated with cancer are tobacco and betel chewing (mouth and lip cancer), smoking (lung cancer), high alcohol consumption (liver, oropharynx or esophagus cancer) and circumcision (cancer of the penis or cervix). Iatrogenic causes of cancer may include arsenicals, coal tar ointments, isoniazid and antitumor agents. The only human tumor probably induced by a virus is the Burkitt lymphoma. Animal studies suggest the carcinogenic effects of fungi-infected foods (especially if aflatoxin is produced), plants containing pyrrolizidine alkaloids (used as flavoring agents and in folk medicine) and cycad nuts. (23 references)

69-228 THE GEOGRAPHICAL DISTRIBUTION OF CANCER. (E.) Doll, R. (University Coll. Hosp., London). T. Norske Laegeforen. 88(12):1160-1165, 1968.

Hereditary and/or environmental factors associated with malignant disease in different parts of the world are discussed on the basis of mortality and morbidity statistics from the International Union Against Cancer in adults (age 35-64 yr.). Specific data and distribution maps are not included. Tumors discussed most extensively are cancer of the esophagus (with a high frequency in 5 widely separated areas and a possible "epidemic" in South Africa of unknown cause), lung (associated with cigarette smoking), stomach (with a decreasing frequency east to west), colon (high incidence in Uruguay and the English-speaking nations), breast (with a decreasing frequency west to east in postmenopausal women), liver (a high frequency in some areas of tropical Africa) and the Burkitt lymphoma (probably virus-induced). It is concluded that geographical variations in cancer incidence are rarely or never solely genetic; that cancers of different type must be considered as separate diseases; that few cancers have only 1 cause (the Burkitt lymphoma, for example, may be virus-induced in Africa but not in Europe or North America); and that some carcinogenic factors interact with each other, the quantitative effect of 1 factor being modified by the presence or absence of others. (20 references)

69-229 EPIDEMIOLOGIC CANCER RESEARCH. (Nor.) Pedersen, E. T. Norske Laegeforen. 88(12):1166-1173, 1968.

Epidemiologic methods and their relative accuracies are discussed, using data on the morbidity rates for cancer of the thyroid, stomach, lip, breast and lung in the Scandinavian countries by way of illustration. (17 references)

69-230 ANIMAL TUMORS. (Nor.) Svenkerud, R. (Vet. Hosp., Oslo). T. Norsk. Laegeforen. 88(12):1155-1160, 1968.

Geographical variations in the incidence of spontaneous tumors in animals are discussed on the basis of previously published data. (55 references)

69-231 HORMONES, VIRUSES AND CANCER. (Nor.) Arnesen, K. T. Norske Laegeforen. 88(12):1200-1204, 1968.

Problems of hormone dependence in human cancer (prostate, thyroid, breast) and certain virus-induced animal tumors (mammary tumors, Rous sarcoma, Shope fibroma and some leukemias) are discussed. It is suggested that certain virus-induced tumors are promoted by hormones, such as estrogen promotion of virus-induced mammary tumors, or estrogens and corticosteroids as cofactors for Gross virus leukemia. (22 references)

69-232 VIRUSES AS ETIOLOGIC FACTORS IN CANCER. (Nor.) Helgeland, K. T. Norske Laegeforen. 88(12):1210-1214, 1968.

Mechanisms of tumor induction and cell transformation by DNA- and RNA-containing viruses are discussed, with particular reference to previously published studies of Rous sarcoma virus (RSV) and SV40. Interactions between viral and host cell nucleic acids seem to involve several steps: for example, in RSV-infected cells, the transformation of virus RNA to provirus DNA is blocked by specific DNA synthesis inhibitors (methotrexate, cytosine arabinoside, 5-fluoro-2'-deoxyuridine) and the progression from provirus DNA to viral RNA (as in virus-synthesizing transformed cells) is blocked by inhibitors of messenger RNA (actinomycin D). (5 references)

69-233 PRESENT STATUS AND PROSPECTS IN CHROMOSOMAL STUDIES IN PROLIFERATIVE AND NEOPLASTIC DISEASE. (Pol.) Pawelski, S. (Hematol. Inst., Chocimsky St., Warsaw). Pol. Arch. Med. Wewnet. 40(6):661-665, 1968. (17 references)

69-234 SEROLOGIC APPROACHES TO THE STUDY OF CANCER IN ANIMALS AND IN MAN. (E.) Old, L. J. (Sloan-Kettering Inst., New York, N. Y.), E. A. Boyse, G. Geering and H. F. Oettgen. Cancer Res. 28(7):1288-1299, 1968. (86 references)

69-235 GENETIC ORIGIN OF TUMOR ANTIGENS. (E.) Boyse, E. A. (Sloan-Kettering Inst., New York, N. Y.), L. J. Old, E. Stockert and N. Shigeno. Cancer Res. 28(7):1280-1287, 1968. (36 references)

9-236 SUMMARY: ANTIGENS OF CHEMICALLY INDUCED TUMORS; AND SEARCH FOR TUMOR-SPECIFIC NTIGENS IN OTHER HUMAN CANCERS. (E.) Klein, G. (Karolinska Inst., Stockholm). Cancer Res. 28(7): 1354-1356, 1968. (4 references)

9-237 AN HISTORICAL SKETCH OF EXPERIMENTAL LEUKEMIA. (E.) Furth, J. (Columbia ., New York, N. Y.). Pp. 1-13 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (82 references)

69-238 VIRUS-INDUCED MURINE LEUKEMIA. (E.) Rich, M. A. (Albert Einstein Med. Ctr., Philadelphia, Pa.). Pp. 15-49 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (266 references)

69-239 PATHOLOGY OF MURINE LEUKEMIAS. (E.) Siegler, R. (New England Deaconess Hosp., Boston, Mass.). Pp. 51-95 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (29 references)

69-240 MORPHOLOGY OF MURINE LEUKEMIA VIRUSES. (E.) De Harven, E. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.). Pp. 97-129 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (118 references)

69-241 RADIATION-INDUCED LEUKEMIA. (E.) Upton, A. C. (Oak Ridge Nat. Lab., Tenn.) and G. E. Cosgrove, Jr. Pp. 131-158 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (238 references)

69-242 CHEMICAL AND HORMONAL INDUCED LEUKEMIA. (E.) Bergs, V. V. (U. Miami Sch. Med., Fla.). Pp. 159-172 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (51 references)

69-243 EXPERIMENTAL LEUKEMIA IN CATS AND DOGS. (E.) Rickard, C. G. (Cornell U., Ithaca, N. Y.). Pp. 173-189 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (17 references)

69-244 BOVINE LEUKEMIA. (E.) Marshak, R. R. (U. Pennsylvania, Philadelphia) and D. A. Abt. Pp. 191-204 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (42 references)

69-245 INTRODUCTION TO AVIAN LEUKEMIA. (E.) Beard, J. W. (Duke U. Med. Ctr., Durham, N. C.). Pp. 205-232 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (125 references)

69-246 THE PATHOLOGY OF AVIAN LEUKEMIA. (E.) Helmboldt, C. F. (U. Connecticut, Storrs) and T. N. Fredrickson. Pp. 233-259 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (65 references)

69-247 ANTIGENIC STRUCTURE OF AVIAN LEUKOSIS/SARCOMA VIRUSES. (E.) Dougherty, R. M. (State U. New York, Upstate Med. Ctr., Syracuse). Pp. 261-276 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (63 references)

69-248 VIRUS-INDUCED AVIAN LEUKEMIA--CELL-VIRUS RELATIONSHIPS. (E.) De-Thé, G. (Res. Ctr. Normal and Cancerous Cells, Villejuif, France). Pp. 277-308 Experimental Leukemia Rich, M. A. (Ed.) Appleton-Century Crofts, New York, 1968, 308 p., $15.00. (102 references)

69-249 DEMOGRAPHY, ETIOLOGY, EXPERIMENTAL STUDY OF PRIMARY BRONCHIAL CARCINOMAS. (Fr.) Rullière, R. Gazz. Hop. (Paris) 140(18): 636-638, 1968.

69-250 EPIDEMIOLOGY OF CARCINOMA OF THE CERVIX. (It.) Feo, F. Minerva Med. 59(7):317-321, 1968.

69-251 THE RIDDLES OF CANCER CELLS. (E.) Bernhard, W. (Inst. Scient. Res. Cancer, Villejuif (Paris), France). Indian J. Cancer 5(1):1-13, 1968.

69-252 DO ADENOMATOUS POLYPS BECOME MALIGNANT? (E.) Kwon, S. H. (Harper Hosp., Detroit, Mich.). Harper Hosp. Bull. 26(3):113-121, 1968.

69-253 CANCER OF THE INTEGUMENTARY TISSUES IN UGANDA AFRICANS: THE BASIS FOR PREVENTION. (E.) Davies, J. N. P. (Albany Med. Coll., N. Y.), R. Tank, R. Meyer and P. Thurston. J. Nat. Cancer Inst. 41(1):31-51, 1968.

In 880 Uganda Africans with superficial tumors (excluding Kaposi's sarcoma and penis cancer) seen in 1946-1960, the male:female ratio (533:347) was about the same as that for hospital admissions in Uganda. Squamous cell carcinoma of the leg was seen in 80.4% of 501 pts., compared to 26.3% in 26 American Negroes and 6.3% in 128 white or Mexican Americans. The frequency of squamous cell carcinoma of the head and neck (except conjunctiva) in these 3 groups was 8%, 57.9% and 70.3%, resp. Specific sites of squamous cell carcinoma of the leg (400/410 Uganda pts.) were the feet (45), legs from ankle to knee (300), knee folds (28), thigh (17) and inguinal area (excluding metastases; 17). Pre-existing lesions in 396/400 included phagedenic ulcers (373), burn scars (7), madurmycosis (5), inguinal buboes (probably lymphogranuloma inguinale; 6), varicose ulcer, yaws, leprosy or a drainage sinus from osteomyelitis (1 pt. each). Most squamous and basal cell carcinomas of the foot (32/45 and 2/4, resp.) developed on the plantar area. Pre-existing lesions in pts. with squamous cell carcinoma of the elbow fold were scars in 11/11 (burns in 5/11, undetermined in 6/11). Pre-existing lesions in 7 pts. with squamous cell carcinoma of the trunk included burn scars (3/7), possible mycobacterial ulcers (3/7) and albinism (1/7); in 4 women with carcinoma of the axillary folds, irritation from clothing was suspected. Facial carcinomas arose in burn scars in 2/18 and 4/18 other pts. were albinos; the only suspected etiologic agent in pts. with squamous cell carcinoma of the head and neck (41) or eyelid (16) was sun exposure (18 pts. with scalp tumors, 10 with upper eyelid tumors). No definite cause could be determined for the pts. with carcinoma of the scrotum or perineum (22, excluding pts. with urinary fistula) or conjunctiva (93). Most of the melanomas (198 pts.) involving the legs (159; 114/119 localizable foot lesions were on the plantar surfaces), arms (11), eyes (21) and oronasal area (6) were seen in children and adolescents. By comparison, the sites of melanomas in 287 Negro and 1235 white Americans were the legs in 74.2% and 29.6%, resp., arms in 4.5% and 10.9%, resp., head and neck in 3.8% and 21.3%, resp., trunk in 3.5% and 23.6%, resp., eyes in 9.8% and 5.1%, resp., and oronasal areas in 4.2% and 9.4%, resp. Many of the Ugandan pts. with melanoma developed widespread dissemination shortly after traditional treatment (cauterization) for small nodules.

69-254 PREMALIGNANT CHANGES OF THE MOUSE OVARY AFTER IONIZING IRRADIATION. (Rus.) Gubareva, A. V. (Central Roentg.-Radiol. Inst., Moscow). Vop. Onkol. 14(5):80-86, 1968.

"Radiation oophorectomy" doses of ^{60}Co (200 r) resulted in the disappearance of mature or maturing ovarian follicles and their replacement by ova-free primordial-type follicles after 1 mo. in mice. The theca tissue showed hyperplasia and lipid accumulation at 1 mo., which progressed to fatty degeneration with occasional hyperplasia of the ovarian rete after 2.5 mo. Luteinization and epithelialization were noted after 3 mo., with spherical areas of granulosa cell proliferation. At 5 mo., granulosa cell tumors had sometimes reached significant size. Cystic tubular adenomas developed from the rudimentary epithelium after 6 mo., with further luteinization and stromal epithelialization; these changes were more marked after 10 mo. After 11-12 mo., ovarian epithelialization and nodular proliferation in several areas (theca tissue, stroma of the tubular adenomas and stroma surrounding the follicles) was advanced; 2 types of proliferation were seen in the ovarian cells, papillae or pseudopapillae covered by tubulo-uterine epithelium, and massive proliferation of lipid-containing granulosa cells. These changes (diffuse hyperplasia to nodular proliferation to tumors) were accompanied by atrophy of the uterine mucosa. All of the basic ovarian cells participated in the formation of granulosa cell tumors, but the primary roles were played by the theca cells and the germinal epithelium.

69-255 RADIATION ENHANCEMENT OF SV40 TRANSFORMATION IN 3T3 AND HUMAN CELLS. (E.) Pollock, E. J. (Nat. Ctr. Radiol. Health, Rockville, Md) and G. J. Todaro. Nature 219(5153):520-521, 1968.

The colony-forming ability of confluent cultures of 3T3 mouse fibroblasts was not affected by infection with SV40 strain 776 ($10^{7.0}$ or $10^{8.6}$ TCID/ml); cell survival was not affected by SV40 infection before or after irradiation (R; 300-1200 rads) at any R dose. SV40-induced transformation was enhanced by R at lower doses; at 1200 rads, colony formation was reduced because of a marked reduction in cell survival, but transformation rates in surviving colonies were enhanced at all R doses. In normal human diploid fibroblasts, R alone did not induce transformation. In human fibroblasts infected with a small plaque mutant of SV40, the ratio of transformed colonies to cells plated increased from 2.4×10^{-5} (unirradiated, infected controls) to 9.8×10^{-5} (R after infection) or 16.0×10^{-5} (R before infection). The transforming capacity of SV40 in either cell strain was not affected by application of R (up to 2000 rads) to the virus itself.

69-256 LATE RADIATION CANCER OF THE SKIN. (Rus.) Stiop, L. D. (Herzen Oncol. Res. Inst., Moscow). Med. Radiol. (Moskva) 13(6):8-12, 1968.

Three cases of radiation skin cancer are described. A 71-yr.-old woman, who had received X-rays (doses not stated) for a neck tumor 57 yr. previously (without effect; the tumor was removed 2.5-3 mo. later), developed keratotic squamous cell carcinoma at the site of X-ray exposure. The tumor had a highly malignant course; the pt. did not respond to electrosurgery or chemotherapy and died 2 yr. after the onset of skin cancer. A 36-yr.-old woman, who had received X-ray therapy (doses not stated) for trichophytosis 19 yr. previously, developed an ulcer at the site of treatment (skin of the parietal region), which was ineffectively treated by ointment; 9 yr. later (28 yr. after X-ray therapy), biopsy of the ulcer revealed keratotic squamous cell carcinoma. X-ray treatment (about 10,500 rads) reduced tumor resorption; the ulcer remained and destructive process in the cranial bones enlarged and were later treated surgically. The pt. was free of recurrence and metastases 1 yr. later. A 57-yr.-old woman, treated with X-rays (doses not stated) 35 yr. previously for lichen planus of the occipital region, developed an infiltrating basal cell carcinoma at the site of irradiation, which was resorbed 2 wk. after X-ray treatment (4000 rads). The high radiosensitivity of the radiation tumors in 2/3 is emphasized.

69-257 MENINGIOMA FOLLOWING RADIUM THERAPY: CASE REPORT. (E.) Feiring, E. H. (Montefiore Hosp., Bronx, N. Y.) and W. H. Foer. J. Neurosurg. 29(2):192-194, 1968.

A 30-yr.-old woman with sensorimotor deficits of the face and right arm of a few mo. duration showed an area of atrophy and hair loss of the left frontoparietal scalp, overlying an area of exostosis. Carotid arteriography showed a tumor of the suprasylvian region and the diagnosis of meningioma was confirmed at operation; the pt. was asymptomatic 1 yr. postoperatively. This pt. had undergone radium applications for vascular nevi of the left frontoparietal scalp, right forehead and right foot at the age of 2 yr. The subsequent development of a meningioma directly under the site of the original irradiated scalp lesion suggested a radiation-induced tumor (although no unequivocal reports of truly benign radiation-induced meningiomas could be found). The pt. showed no other signs of any of the hereditary diseases characterized by skin and brain lesions (tuberous sclerosis, von Recklinghausen's neurofibromatosis, neurocutaneous melanosis or the Sturge-Weber syndrome).

69-258 TRAUMA AND INTRAOCULAR TUMORS. (Cz.) Anton, M. (Eye Clinic, Brno, Czechoslovakia). Cesk. Oftal. 24(3):203-206, 1968.

Among 797,842 pts. observed in the Brno eye clinic from 1930-1966, 195 showed intraocular tumors and 26/195 had histories of eye injuries. In 20/26, the relationship was regarded as coincidental; in 4 pts. there was no apparent relationship between trauma and the tumor, while in 2 pts. (1.02% of 195 pts.) a relation between the injury and the tumor seemed very probable. Most of the tumors were melanoblastomas. Recommended criteria for the determination of tumor development from an injured area include proof of an injury causing primary damage, evidence that the tumor is growing at the site of trauma, histological proof of continuous traumatic irritation, an adequate latent period, and predisposition to neoplasms.

See also abstract nos.: 222,241

69-259 THE DEVELOPMENT OF NEUROGENIC NEOPLASMS, EMBRYONAL KIDNEY TUMORS, HARDERIAN GLAND ADENOMAS, ANITSCHKOW CELL SARCOMAS OF THE HEART, AND OTHER NEOPLASMS IN URETHAN-TREATED NEWBORN RATS. (E.) Vesselinovitch, S. D. (Chicago Med. Sch., Ill.) and N. Mihailovich. Cancer Res. 28(5):888-897, 1968.

Newborn random-bred MRC rats were treated with 6 or 10 i.p. inj. of urethan (U; each 0.5 mg/g at 3-day intervals; total 3 or 5 mg) and the tumor incidence was studied at age 110 wk. The total tumor incidence (benign and malignant) in male and female 20-wk. survivors was 79.5% and 76.3% (31/39 and 29/38), resp., at the lower dose (35.9% and 23.7%, resp., had multiple tumors), compared to 82.9% (34/41) and 90.4% (38/42), resp., at the higher dose (43.9% and 64.2%, resp., had multiple tumors). Liver tumors in males and females were seen in 46.3 and 59.5, resp., at the higher dose and 23% and 18.4%, resp., at the lower dose. The incidence of pituitary adenomas was significantly higher in females (21% and 23.8% at the low and high doses, resp.) than in males (0% and 4.9%, resp.); the low and high doses induced uterine tumors in 10.5% and 16.7%, resp., of the females, mammary tumors in 0% and 26.3%, resp., of males, and mammary tumors in 2.4% and 30.9%, resp., of the females. The incidence of neurogenic tumors of the brain and peripheral nerves was higher in males (17.9% + 12.8% at the lower dose; 12.2% + 12.2% at the higher dose) than in females (2.6% + 10.5% at the lower dose; 4.7% + 21.4% at the higher dose). Kidney tumors of the embryonal or epithelial type developed in 6 rats at the lower dose and 5 admin. the higher dose; the av. survival time in rats with embryonal tumors (7/11) was shorter than in rats with epithelial tumors (av. 62 and 78 wk., resp.). Other tumors induced by the lower U dose included lymphoma (2/39 males, 2/38 females), thyroid carcinoma or Zymbal gland adenoma (each 1/39 males), adrenocortical adenoma or adamantinoma (each 1/38 females), heart sarcoma and hemangioma (1 male and 1 female with each tumor). Other tumors induced by the high U dose included adenomas of the Harderian glands (3/41 males, 4/42 females) or Zymbal glands (3/41 and 1/42, resp.), lymphoma (3/41 and 1/42, resp.), heart sarcoma and hemangioma (2/41 and 1/42, resp., in each group), liver embryoma, intestinal adenocarcinoma (each 1/41 males) and adrenocortical adenoma (1/42 females).

69-260 THE INDUCTION OF BENIGN AND MALIGNANT LIVER TUMORS BY URETHAN IN NEWBORN RATS. (E.) Vesselinovitch, S. D. (Chicago Med. Sch., Ill.) and N. Mihailovich. Cancer Res. 28(5):881-887, 1968.

The incidence of benign and malignant liver tumors at age 110 wk. was studied in random-bred MRC rats admin. urethan (U; 0.5 mg/g every 3 days) from age 24 hr. to 16 or 28 days (total 3 or 5 mg/g in 6 or 10 inj., resp.). Benign or malignant liver tumors developed in 27% of all treated rats; no malignant liver tumors were seen in the animals (number not stated) developing benign liver tumors. The liver tumor incidence was 20.8% at the lower dose of U and 53% at the higher dose at age 110 wk. Hepatomas developed in 4/77 and 12/83, resp., hepatocarcinomas in 12/78 and 32/83, resp., cholangiomas in 1/78 and 9/83, resp., and and cholangiocarcinomas in 1/78 and 3/83, resp.; 14/44 (32%) of the rats with hepatocellular carcinomas also developed cholangiomas and cholangiocarcinomas. Most tumors developed at age 90 wk. or over. The reduced survival rates at 60 or 110 wk. in treated rats resulted from tumor development; no differences in body wt. curves between treated and control rats were noted. No sex difference in tumor incidence was seen in the treated rats. No tumors developed in untreated controls.

69-261 RADIOAUTOGRAPHIC STUDY ON RNA LABELING IN RAT LIVER PARENCHYMA DURING DAB CARCINOGENESIS. (E.) Daoust, R. (U. Montreal, Canada) and A. Simard. Cancer Res. 28(5):874-880, 1968.

Cytidine-3H uptake by RNA was studied in normal, premalignant (basophilic and hypo- or hyperbasophilic) and malignant liver parenchymal cells of adult male Wistar rats after up to 150 days of feeding a low-protein basal diet containing 4-dimethylaminoazobenzene (DAB; 0.06%). Labeling was weak in the hypobasophilic cells, appearing in the centrolobular areas after short courses of DAB, which soon became necrotic. The basophilic parenchymal cells in the portal areas (which later became nodules of regenerating tissue) showed stronger RNA labeling than normal cells. RNA labeling was further increased in the hyperbasophilic and still further in the hepatoma cells (appearing after 90 days of DAB feeding). Time studies (1-8 hr. and 1-3 days after label inj.) indicated a more rapid loss of labeled RNA from the hyperbasophilic and hepatoma cells than from the basophilic cells. Variations in RNA labeling (which appeared first in the nucleus and later progressed to the cytoplasm in all cell types) were apparently correlated with the increases in mitotic activity and DNA synthesis. All differences in RNA labeling between the malignant, hyperbasophilic, basophilic and normal cells were highly significant.

69-262 CHEMICALLY INDUCED MAMMARY CANCER IN RATS WITH ALTERED THYROID FUNCTION. (E.) Newman, W. C. (U. Tennessee Med. Units, Memphis) and R. C. Moon. Cancer Res. 28(5):864-868, 1968.

Mammary tumor frequencies were studied in virgin female Sprague-Dawley rats about 7 mo. after the beginning of treatment with 3-methylcholanthrene

(MC; 10 mg/day x 20 p.o., from age 50 days) alone or + sodium L-thyroxine (T; 2.5 μg/100 g/day s.c.) or propylthiouracil (PTU; 0.03% in diet). T and PTU were admin. throughout the experiment, beginning 10 days before MC; in 2 groups, PTU was replaced by T, or T by PTU, 10 days after MC was stopped. The mammary tumor incidence was 100% with MC alone or T + MC + T, with mean times to appearance (MTA) of 50.6 and 66.2 days, resp. In rats with PTU-induced hypothyroidism, the tumor incidence fell to 66.7% (MTA = 89.2 days) when PTU was admin. before and after MC. In rats admin. T replacing PTU or PTU replacing T (after MC was stopped), the tumor incidence was about the same as with MC alone (93.7% and 93.3%, resp.; MTA = 58.9 and 71.1 days, resp.). PTU alone did not induce tumors. It is suggested that changes in the response to MC by alteration of thyroid hormone levels resulted primarily from the growth-promoting stimulus of thyroid hormone, or its absence, on established tumor cells.

69-263 UNUSUAL NEOPLASMS AND HYPERPLASTIC LESIONS IN "RANDOM-BRED" MICE DERIVED FROM FOUR-WAY CROSSED INBRED LINES. (E.) Poel, W. E. (U. Pittsburgh, Pa.), A. Ciocco and D. P. Doolittle. Cancer Res. 28(5):845-859, 1968.

All possible 2-way crosses of C57L/HeDt (low mammary tumor; high reticulum cell sarcoma; occasional hepatoma or pituitary tumors in aged animals), SWR/LyDeDt (agent-positive; high mammary tumors and primary lung tumors in females), C3HeB/DeDt (presumably agent-free) and 129/RrDt mice (long-lived; venous congestion and thrombosis of the uterus with reproductive tract tumors in old females; low incidence of testicular teratoma in males) and all possible 4-way crosses of the F_1 generation were made. The 4-way cross offspring were pooled; after successive generations of random breeding, about 1000 virgin females were selected for a 16-mo. bioassay of the effects of Enovid (50:1 mixture of norethynodrel + mestranol; 1 mg/kg/wk.), Norlestrin (50:1 mixture of norethindrone acetate + ethynylestradiol; 1 mg/kg/wk.) and clomiphene (8 mg/kg/wk.). Each agent was admin. by gavage (5 doses/wk.) from the age of 6 wk.; some mice were sacrificed 1 wk. or 3 mo. after the end of treatment (age 17.5 or 20.5 mo.). No tumors or other lesions were attributed to hormone treatment at the low doses used. Amyloidosis, lymphocytic leukemia, mammary tumors and other diseases characteristic of the parental strains were absent in these hybrids, which developed tumors of a variety of types, resembling the spectrum of human tumors more closely than the tumors seen in the parental strains. These included heterotypia (liver, kidney, Brunner's gland, spleen), adenomatous hyperplasia (biliary tract, small intestine, glandular stomach), endometrial polyps or cystic hyperplasia, plasma cell leukemia or Hodgkin's-like reticulum cell sarcoma, and primary tumors of the lung, Harderian glands, adrenal, anterior pituitary, ovary, uterus and pancreas.

69-264 KARYOTYPES OF RATS FROM STRAINS OF DIFFERENT SUSCEPTIBILITY TO MAMMARY CANCER INDUCTION. (E.) Rees, E. D. (U. Kentucky, Lexington), A. E. Shuck, J. C. Christian and J. R. Pugh. Cancer Res. 28(5):823-830, 1968.

Chromosome morphology was studied in bone marrow cells from male and female Sprague-Dawley (S-D) and inbred Long-Evans (L-E) rats. The S-D rats are highly susceptible to mammary carcinogenesis by 3-methylcholanthrene (MC) or 7,12-dimethylbenz(a)anthracene (DMBA); L-E rats are relatively resistant to mammary carcinogenesis, but the leukemia incidence is high. Most rats were 50-100 days old; no age variations were noted. The X and Y chromosomes were similar in both strains; 90% of all cells from S-D rats and 95% of the cells from L-E rats were diploid, most deviations being hypodiploidy. Both members of the #3 pair were subterminal in S-D rats; in L-E rats, 1 was usually terminal and the other subterminal. In inbred but not noninbred L-E rats, 1 of the #12 chromosomes had larger upper arms than the other and 1 of the homologs often showed large satellites on these upper arms. The #13 chromosome showed satellites occasionally in cells from S-D rats and frequently in L-E rats. The numerical distribution of subterminal chromosomes varied from 1 strain to another; in Holtzman and L-E rats, 90.7% and 5.7% of the cells had 10 such chromosomes/cell, resp.; 5.2% and 71.6%, resp., had 9; 4.1% and 21.6%, resp., had 8; 0% and 1.1%, resp., had 7. In S-D rats admin. 1 intragastric dose of MC (100 mg) or DMBA (20 mg), the proportion of bone marrow cells without subterminal chromosomes increased from 8.5% (controls) to 27% and 23.3%, resp. The primary change was loss of a subterminal chromosome (presumably by loss of its upper arms) and gain of a terminal chromosome. No correlation between chromosome morphology and strain differences in susceptibility to mammary carcinogenesis could be established.

69-265 FEATURES OF TUMOR ENHANCEMENT BY CROTON OIL. (E.) Frei, J. V. (McGill U., Montreal, Que., Canada). Cancer Res. 28(5):947-949, 1968.

Tumor promotion by croton oil (CO; painting of 5% mineral oil soln.) was studied in adult male Swiss mice painted with 7,12-dimethylbenz(a)anthracene (DMBA; 0.5% or 1.5% mineral oil soln., 1 dose) 1 wk. before CO was begun. DMBA alone did not induce skin tumors at this dose. Comparison of 17 regimens of treatment (varying the intervals and/or duration of CO admin.) showed that the tumor-enhancing effect of a single dose of CO persisted 2-3 wk. and that CO could promote tumors even when admin. in 2 doses at a 3-wk. interval. One study in mice admin. 1.5% DMBA, followed by CO painting with #00 or #5 brushes (delivering 7.5 and 62.1 mg of CO soln., resp.), demonstrated that the conc. of CO was more important to tumor enhancement than the absolute dosage.

69-266 INDUCTION OF INCREASED BENZPYRENE HYDROXYLASE ACTIVITY BY FLAVONES AND RELATED COMPOUNDS. (E.) Wattenberg, L. W. (U. Minnesota Med. Sch., Minneapolis), M. A. Page and J. L. Leong. Cancer Res. 28(5):934-937, 1968.

Benzpyrene hydroxylase (BPH) induction was studied in liver and lung tissue of female Sprague-Dawley rats 48 hr. after the admin. of several flavone derivatives (0.1 mmole in dimethylsulfoxide p.o.). The most active compounds studied were B-naphthoflavone and 4'-bromoflavone. Halogenation (4'-fluoro- or 4'-bromoflavone, 4'-bromoflavanone) and methoxy group addition (2'-methoxychalcone, nobiletin, tangeretin, hesperidin) increased BPH induction, by comparison to the parent compounds (flavone, flavanone, chalcone), whereas hydroxylation (2'-hydroxy-4-bromochalcone, hesperetin, quercetin and derivatives) reduced enzyme induction. The naturally occurring polymethoxyflavones, nobiletin and tangeretin, were also active BPH inducers.

69-267 THE CARCINOGENICITY OF MULTIPLE INTRAGASTRIC DOSES OF AROMATIC AND HETEROCYCLIC NITRO OR AMINO DERIVATIVES IN YOUNG FEMALE SPRAGUE-DAWLEY RATS. (E.) Griswold, D. P., Jr. (South. Res. Inst., Birmingham, Ala.), A. E. Casey, E. K. Weisburger and J. H. Weisburger. Cancer Res. 28(5):924-933, 1968.

The incidence of mammary and other tumors was studied 9 mo. after admin. of 35 compounds (1 MTD every 3 days x 10) to 45-day-old female Sprague-Dawley rats. Mammary tumors developed in 1/132 untreated and 5/132 sesame oil-treated controls, compared to 29/29 rats admin. 7,12-dimethylbenz(a)anthracene (DMBA), the reference standard. Compounds with borderline activity (in parentheses, the mammary tumor incidence in autopsied animals) were biphenyltetramine (1/20), 1,3,7-tribromo-2-fluorenamine (6/41), 1-anthramine (4/18) and nitrofurazone (3/24). Some activity was seen with tolidine (3/16), 4,4'-thiodianiline (5/20) and 1-chloro-2,4-dinitronaphthalene (4/17). Compounds with definite activity included 2-anthramine (21/30), 2,7-fluorenediamine (15/17), benzidine (16/24), N-6-(3,4-benzocoumarinyl)acetamide (11/19) and (α-[2-methylhydrazino]toluoyl) urea (14/17); most mammary tumors induced by these agents and DMBA were carcinomas, with a smaller number of adenomas, fibroadenomas and hyperplasias. DMBA and 5/12 of these carcinogens induced single tumors of organs other than the mammary gland; similar results were seen with 4,4'-oxydianiline, 4,4'-sulfonyldianiline, 1-methylaminoanthraquinone, N-methyl-N-2,4,6-tetranitroaniline and diphenylthiohydantoin. Kidney cysts were seen in 13/19 rats admin. 2-aminoanthraquinone.

69-268 ULTRASTRUCTURAL ALTERATIONS PRODUCED BY POLYCYCLIC AROMATIC HYDROCARBONS ON RAT TRACHEAL EPITHELIUM IN ORGAN CULTURE. (E.) Dirksen, E. R. (U. California San Francisco Med. Ctr., Calif.) and T. T. Crocker. Cancer Res. 28(5):906-923, 1968.

Tracheal epithelium cultures from 1-2-day-old Nelson rats were studied after 11 days of treatment with various polycyclic aromatic hydrocarbons by acetone soln. Columnar cells treated with the powerful carcinogens 7,12-dimethylbenz(a)anthracene (DMBA; 2.5-5.0 μg/ml) or benzo(a)pyrene (BP; 6 μg/ml) and the weak carcinogens benz(a)-anthracene and 5-fluoro-DMBA (both at 5-50 μg/ml) showed scanty endoplasmic reticulum, many free ribosomes, autophagic vacuoles and numerous filaments in the cytoplasm; they were often interconnected in a stratified epithelium (3-8 cells high) resembling bronchogenic carcinoma in situ or stratified squamous epithelium (e.g., skin). The carcinogens also caused nucleolar fragmentation and disorganization in some cells. The weakly carcinogenic derivatives of DMBA induced these changes at doses 12.5-25-fold higher than the active doses of DMBA. No extensive changes in ultrastructure or epithelial state were seen with anthracene (doses not stated), benzo(e)pyrene (30 μg/ml), phenanthrene (50 μg/ml), chrysene 6.7 μg/ml), benzo(a)fluorene, benz(m,n,o)fluoranthene, perylene or perinaphthoxanthene (each 20 μg/ml).

69-269 CELL PROLIFERATION AND CARCINOGENESIS IN THE HAMSTER CHEEK POUCH. (E.) Reiskin, A. B. (Churchill Hosp., Headington, Oxford, England) and R. J. Berry. Cancer Res. 28(5):898-905, 1968.

Squamous cell carcinomas induced in the cheek pouches of 8-12-wk.-old Syrian hamsters by 7,12-dimethyl-1,2-benzanthracene painting (doses not stated) differed in behavior according to host strain. The mean tumor latent period in inbred dark-eared partial albino (DEA) hamsters was 7.3 wk., compared to 10.0 or 10.75 wk. in random-bred golden or cream hamsters. The av. tumor growth rate was significantly higher in DEA animals than in the other 2 strains. Within each strain, a good qualitative correlation was seen between the mean tumor latent period and the tumor growth rate; the tumor growth rate apparently depended more upon the presence of a "growth fraction" than on tumor cell transit times. Studies of DNA cycles in normal adult, normal newborn, premalignant and malignant cheek pouch epithelium suggested that non-proliferating cells can be divided into a fraction permanently incapable of proliferation and another fraction able to resume proliferation.

69-270 THE RAPID COLLECTION AND APPLICATION OF CIGARETTE SMOKE CONDENSATE. (E.) Millar, J. D. (Southwest Res. Inst., San Antonio, Tex.), J. W. Rhoades and D. E. Johnson. Cancer Res. 28(5):968-971, 1968.

An apparatus for smoke collection is described.

The smoke is condensed by a restricting nozzle, instead of a cold trap or a solvent liquid trap. The condensate can be collected in a weighing bottle for later use, or it can be applied directly to mouse skin within a few sec. to min. after smoke collection; it is suggested that the age of the smoke condensate may be of importance to its biological activity.

69-271 TUMORIGENICITY OF N-NITROSOHEXAMETHYLENEIMINE. (E.) Goodall, C. M. (Chicago Med. Sch., Ill.), W. Lijinsky and L. Tomatis. Cancer Res. 28(7):1217-1222, 1968.

In MRC rats, the acute i.p. LD_{50} of N-nitrosohexamethyleneimine (NHM; N-nitrosoperhydroazepine) was about 336 mg/kg; acute toxic effects included brain edema and liver necrosis. In rats treated with NHM in the drinking water (4 mg/day; 5 days/wk. x 8 wk.), 3/15 females died of liver toxicity after 6-13 wk. Tumors developed in 11/12 surviving females and 15/15 males; the first liver tumors (all tumor-bearing animals) appeared after 16 wk. in a female and 36 wk. in a male. One of the males also had a tongue tumor; other tumors involved the esophagus (4 males, 2 females), nasal cavity (2 males, 2 females) and stomach (carcinoma; 1 female). Survival times were shorter in females than in males (8/15 survived 30 and 50 wk., resp.). In rats admin. lower doses of NHM (1 mg/day until death), no gross toxicity was noted; all rats survived 30 wk. (6/15 females and 11/15 males survived 50 wk.). Tumors developed in 14/15 of each sex, involving the esophagus (13/14 males, 11/14 females), liver (2/14 and 7/14, resp.; the first liver tumors appeared after 48 and 41 wk., resp.), tongue (8/14 and 3/14, resp.), nasal cavity (1 male; developing at 61 wk.), stomach (squamous cell carcinoma; 2 males) and pancreas (carcinoma; 1 male). Liver tumors were hepatic cell carcinomas, endothelial sarcomas or mixed tumor types. Nasal cavity tumors were squamous cell (keratinized) or undifferentiated carcinomas or neuroepithelial tumors. One of the tongue tumors was a squamous cell papilloma and the others were squamous cell carcinomas. Most of the esophageal tumors were multiple squamous cell papillomas and 24/30 (2/6 in mice admin. the higher doses of NHM, 22/24 at the lower dose) also included squamous cell carcinoma.

69-272 GLUCOSE METABOLISM IN SKIN TUMOR AND HYPERPLASIA INDUCED IN THE RHESUS MONKEY BY 7,12-DIMETHYLBENZ(a)ANTHRACENE. (E.) Im, M. J. C. (Oregon Reg. Primate Res. Ctr., Beaverton) J. Nat. Cancer Inst. 41(1):73-79, 1968.

Enzyme activities were studied in biopsy specimens of 1-yr.-old keratoacanthoma and epidermal hyperplasia induced by painting (3 doses/wk. x 5 mo., then 2 doses/wk. x 7 mo.) with dimethylbenzanthracene (DMBA; 0.8 ml of 1% acetone soln.) + the cocarcinogen dodecylbenzanthracene (DBA; 1 ml of 100% soln.) in 3/6 2-yr.-old Rhesus monkeys. Enzyme levels in the benign keratoacanthoma were not significantly different from those in the hyperplastic epithelium, but significant differences from normal epidermis were noted. No significant changes in lactate or malate dehydrogenase were seen. Isocitrate dehydrogenase increased 2-4-fold in the tumors and adjacent tissue and 2-3-fold in hyperplastic and DBA-treated tissue. Glucose-6-phosphate dehydrogenase (GPD) and 6-phosphogluconate dehydrogenase levels increased 5-6-fold and 4-fold, resp., in the tumors and hyperplastic epithelium; glyceraldehyde-3-phosphate dehydrogenase (GAPDH) activity increased 3-fold in these tissues. Treatment with the cocarcinogen alone (DBA) increased GPD and GAPDH levels by factors of 2.4 and 2, resp. It is suggested that the carcinogen causes a shift of glucose metabolism via the pentose cycle so that the tissue also provides basic substances for nucleic acid synthesis and energy (ATP) for increased cell growth.

69-273 TRANSFORMATION AND NEOPLASTIC DEVELOPMENT IN VITRO OF HAMSTER EMBRYONIC CELLS BY 4-NITROQUINOLINE-1-OXIDE AND ITS DERIVATIVES. (E.) Kuroki, T. (Tohoku U., Sendai, Japan) and H. Sato. J. Nat. Cancer Inst. 41(1):53-71, 1968.

Embryonic cells from non-inbred Syrian golden hamsters were treated in vitro with 4-nitroquinoline-1-oxide (NQO) and its 6-chloro- derivative (ClNQO; each 4×10^{-6} M), 4-hydroxyaminoquinoline-1-oxide (HAQO), 4-aminoquinoline-1-oxide (AQO) and 3-methyl-4-nitroquinoline-1-oxide (MNQO; each 10^{-5} M). Signs of malignant transformation (in vitro proliferation; dense, piled up layers; stable and unlimited growth; ability to induce transplantable fibrosarcomas after s.c. inj. into unconditioned newborn or adult hamsters or cheek pouch inj. into adult hamsters) appeared about 20-80 days (minimum 15 days) after the first treatment with carcinogens; no essential differences were seen among cultures treated with NQO, HAQO and ClNQO. Untreated control cultures had a limited lifespan, except for 1/7 which showed spontaneous transformation and tumor development after 260 days of cultivation. Cultures treated with non-carcinogenic compounds (AQO and MNQO) resembled the control cells. The shortest time required for induction of a transplantable tumor by the carcinogens was 49 days after in vitro treatment. The transformed cells showed no specific resistance to the toxic actions of NQO (compared to non-transformed mouse or hamster fibroblast strains L and BHK-21, resp.).

69-274 VASCULAR ABNORMALITIES INDUCED BY BENZO(α)PYRENE: AN IN VIVO STUDY IN THE

HAMSTER CHEEK POUCH. (E.) Rijhsinghani, K. (Chicago Med. Sch., Ill.), M. Greenblatt and P. Shubik. J. Nat. Cancer Inst. 41(1):205-216, 1968.

Epithelial and vascular changes were studied in cheek pouches of random-bred female Syrian golden hamsters painted with benzo(α)pyrene (BP; about 1.7×10^{-4} g/dose; 2-3 doses/wk.) for up to 44 wk. (max. 110 doses in 11 mo.). Painting with the vehicle alone (acetone) induced benign basal cell hyperplasia and Stage A vascular changes (dilatation and tortuosity). BP admin. for up to 22 wk. induced benign basal cell hyperplasia with Stage A or B (loop formation and glomeruloid alterations) vascular changes. Similar changes were seen in 4/5 animals treated for 24-30 wk.; 1/5 showed severe atypical hyperplasia with Stage A and D (severe neovascularization) vascular changes. After 38-40 wk., 4/6 developed carcinoma in situ and 2/6 developed invasive carcinoma with some vascular abnormalities. After 41-44 wk., BP induced benign epithelial hyperplasia in 2/10 (with max. of Stage B vascular changes); severe atypical hyperplasia was seen in 2/10, carcinoma in situ in 2/10 and invasive carcinoma in 4/10, all with vascular changes up to and including Stage D. The vascular stromal changes paralleled and preceded tumor development.

69-275 NITROSAMINE-INDUCED TUBULAR GLYCOGEN STORAGE AND TUMOR DEVELOPMENT IN RAT KIDNEY. (Ger.) Bannasch, P. (U. Wurzburg, Germany) and U. Schacht. Virchows Arch. Abt. B Zellpath. 1(2):95-97, 1968.

Admin. of N-nitrosomorpholine (NNM; 12 mg% in drinking water) for 7-9 wk. to 64 male Sprague-Dawley rats in their drinking water frequently induced epithelial (solid, tubular or cystic papillary) kidney tumors which developed from characteristically changed tubuli, several wk. after discontinuation of the carcinogen. Immediately after the end of NNM, no kidney tubular changes were seen in 24 rats; 4-5 wk. later, 4/19 showed characteristic glycogen storing tubules and 22-87 wk. after discontinuation of NNM this frequency rose to 13/21. At this time, all rats also showed unusual large cells with finely granular oxyphilic cytoplasm (oncocytes) in the tubules. It was assumed that the glycogen-storing tubules were precursors of "hypernephroid" (4/19 rats) and basophilic (6/19 rats) adenomas, while oxyphilic adenomas developed from the eosinophilic tubules. It is suggested that focal glycogenosis preceded the development of "hypernephroid" and basophilic renal tumors.

69-276 INFLUENCE OF HORMONAL TREATMENT OF FISCHER RATS ON THE BIOCHEMISTRY OF TRANSPLANTABLE DIMETHYLBENZ(a)ANTHRACENE-INDUCED MAMMARY CARCINOMA AND ITS SUBLINES. (E.) Hilf, R. (Squibb Inst. Med. Res., New Brunswick, N. J.), A. Segaloff and L. J. Lerner. Cancer Res. 28(8): 1550-1558, 1968.

Growth patterns of s.c. inoc. dimethylbenzanthracene-induced mammary adenocarcinoma #13762 were studied in Fischer rats. Four tumor sublines were studied: 2 maintained in normal male (NM) or normal female (NF) hosts; 1 line maintained for 1 yr. in males treated with testosterone propionate (TP; 50 mg/kg/day s.c.; TPM line) and 1 maintained for 1 yr. in females treated with estradiol (E; 1 mg/kg/day s.c.; EF line). Rats were inoc. s.c. with 2 tumors, the NM and TPM lines or the NF and EF lines, 1 on each side, then treated with TP or E (doses as above) 1 day later; tumor wt. was studied 22 days after tumor inoc. Final av. wt. of the NF tumor was about the same in males and females (2.8 and 2.03 g, resp., in untreated controls); E did not significantly reduce tumor wt. (av. 1.86 and 0.98 g, resp.), but TP significantly inhibited the tumor in both males and females (av. 0.93 and 0.51 g, resp.). The NM tumor grew more rapidly in untreated males than in females (av. 14.59 and 8.34 g, resp.) and was not significantly affected by TP or E. The TPM tumor grew poorly in untreated controls (av. 0.05 g in females and 0.06 g in males) and was not significantly affected by E (av. 0.07 and 0.06 g, resp.), but was significantly stimulated by TP (av. 1.23 and 1.28 g, resp.). The EF tumor grew better in untreated females than in males (av. 1.33 and 0.51 g, resp.); TP stimulated it in females but not in males (av. 3.59 and 0.23 g, resp.), while E stimulated it in males but not females (av. 2.68 and 2.3 g, resp.). The levels of carbohydrate- and lipid-mobilizing enzymes were highest in the NF tumor and lowest in NM in female and male hosts, resp.; inoc. of these tumors into opposite-sex hosts increased or reduced enzyme activities in the direction of the normal tumor lines of male or female hosts. Changes in enzyme activity reflected tumor growth rate in all systems except the TPM tumor in E-treated mice, which showed increased enzyme levels and gross lactation although no tumor growth stimulation was noted. The TPM line in rats admin. TP for 5-7 wk. showed a continuous increase in α-glycerol phosphate, malate and glucose-6-phosphate dehydrogenases, suggesting a direct action of TP on enzyme metabolism in this tumor.

69-277 SEX HORMONES AND SKIN TUMORIGENESIS. I. EFFECT OF THE ESTROUS CYCLE AND CASTRATION ON TUMORIGENESIS BY 7,12-DIMETHYLBENZ(a)ANTHRACENE. (E.) Bates, R. R. (NCI, Bethesda, Md.) J. Nat. Cancer Inst. 41(2):559-563, 1968.

Skin papilloma induction by painting with dimethylbenzanthracene (DMBA; 16 μg x 1 in 0.2 ml acetone) and croton oil (CO; 0.2 ml of 1% acetone soln.; 1 dose/wk.) was studied in random-bred NIH General Purpose Swiss mice. In males and females admin. CO beginning 1 wk. after DMBA (continued for 22 wk.), the tumor incidence in 39 males and 39 females was 79% and 18%, resp. (5.9 and 0.26 tumors/mouse, resp.). In 28 males undergoing orchiectomy (orx.) 13-14 days after DMBA admin. (with

CO promotion beginning 28 days after DMBA and continued for an unspecified time), the tumor incidence was 71%, compared to 89% in sham-operated males (10.89 and 10.72 tumors/mouse, resp.). This difference was not significant. In 21 mice undergoing orx. 14-15 days before DMBA admin., the tumor incidence and the number of tumors/mouse fell significantly (52% and 7.52/mouse, resp.). In female mice undergoing oophorectomy (oox.) 13-15 days after or before DMBA admin. (37 mice/group; CO was begun 29 days after DMBA and continued for an unspecified time), the skin tumor incidence was 46% and 52%, resp. (mean 3.00 and 4.72 tumors/mouse), compared to 30% in 43 sham-operated controls (1.33 tumors/mouse). The increased tumor incidence in mice oox. before DMBA admin. was significant. The intermediate effect of oox. after DMBA may indicate an effect of oox. on promotion as well as initiation, but 59 tumors were from 2 mice (none of the controls had over 10 tumors). The stage of DMBA carcinogenesis affected by oox. therefore could not be determined, although oox. did remove an inhibitor of DMBA carcinogenesis. The relationship between the estrus cycle and DMBA carcinogenesis (with 26-wk. CO promotion beginning 11 days after DMBA) was studied in 156 intact females. Mice in metestrus or diestrus at the time of DMBA admin. showed a higher tumor incidence (64% and 74%, resp.) than mice in proestrus or estrus (60% and 42%, resp.); the highest tumor incidence (73%; av. 4.65 tumors/mouse) was seen in mice in diestrus 1 day after DMBA admin. Mice in proestrus or diestrus 2 days after DMBA admin. showed a higher tumor incidence (70% in each group) than mice in estrus or metestrus at that time (54% and 50%, resp.), suggesting that DMBA is most carcinogenic to mice in diestrus or about to enter diestrus.

69-278 PRIMARY IMMUNE RESPONSE IN SWISS MICE INJECTED AT BIRTH WITH A SINGLE DOSE OF 7,12-DIMETHYLBENZ(α)ANTHRACENE. (It.) Baroni, C. (U. Pavia, Italy), G. Bertoli, and N. Fabris. Tumori 54(2):117-126, 1968.

In newborn Swiss mice treated with dimethylbenzanthracene (DMBA; 100 μg x 1 s.c. in oil), the number of nucleated spleen cells from age 20-150 days was about the same as in untreated controls; at age 10-20 days it was below normal and at age 150-200 days it declined rather rapidly. No tumors developed in untreated controls or in 29 DMBA-treated mice under 100 days old (except for a s.c. sarcoma in 1/6 at age 50 days). Tumors in older treated mice included thymic lymphosarcoma, s.c. sarcoma or both in 6, 4 and 6/19, resp., at age 100 days and s.c. sarcomas alone or + thymic lymphosarcoma in 1 and 1/6, resp., at age 150 days and in 2 and 1/5, resp., at age 200 days. All DMBA-treated mice, with or without tumors, showed a marked decrease in immune reactivity, as shown by the spleen antibody plaque-forming cell (APFC) test after challenge with sheep RBC. The number of APFC was further reduced in tumor-bearing animals, particularly in mice with thymic lymphomas. The permanent immunosuppression induced by neonatal DMBA admin. may have favored the development of tumor cells by reducing the host's capacity to recognize their antigenicity.

69-279 THE UPTAKE OF SIMULTANEOUSLY ADMINISTERED (^{3}H)OESTRADIOL AND (^{14}C)PROGESTERONE BY DIMETHYLBENZANTHRACENE-INDUCED RAT MAMMARY TUMOURS. (E.) Mobbs, B. G. (St. Mary's Hosp. Med. Sch., London). J. Endocr. 41(3):339-344, 1968.

Female Sprague-Dawley rats with steadily growing mammary tumors induced by 7,12-dimethyl-1,2-benzanthracene (40 mg p.o.) were treated s.c. with ^{14}C-labeled progesterone (P; 48.3 μg = 3.3 μC) + ^{3}H-labeled estradiol (E; 16.7 μC = 0.11-0.16 μg/100 g). Tumor and muscle biopsy specimens were obtained and oophorectomy (oox.) was performed 11-145 min. later; tumor growth was measured thereafter, until the rats were sacrificed about 4 wk. after oox. Of the 25 adenomas or adenocarcinomas, 11 regressed after oox. (hormone-sensitive), 6 continued to grow (hormone-insensitive) and 8 contained both hormone-sensitive and hormone-insensitive areas; 5 other tumors were fibroadenomas. The hormone-sensitive tumors did not take up or retain P to the same extent as E, suggesting that the mechanism of action of P does not involve retention by the target tissue. E uptake in hormone-responsive tumors was not affected by P, but P tended to stimulate E uptake (and/or uptake of free steroid metabolites of E) in the hormone-insensitive tumors.

69-280 STUDY OF NERVOUS SYSTEM TUMORS OBTAINED BY METHYLNITROSOUREA ADMINISTRATION IN RATS. (Fr.) Stroobandt, G. (Catholic U., Louvain, Belgium) and J. M. Brucher. Neurochirurgie 14(4):515-535, 1968.

Methylnitrosourea (MNU; 4-5 doses/wk. of 5 mg/kg by stomach tube; total 435 mg/kg in 87 doses over 134 days if possible) was admin. to 44 male Wistar rats. Of the 26 rats surviving for 163-238 days of observation, 17 developed a total of 29 nervous system tumors: 14 oligodendrogliomas (8 frontal and/or parietal lobe, 3 corpus callosum, 1 each thalamus, frontal cortex and internal capsule), 1 glioblastoma fusiforme (parieto-occipital), 4 microgliomas (3 parietal cortex and hippocampus, 1 brain stem), 2 gangliocytomas (spine or brain stem), 2 spinal medulloblastomas and 4 malignant neurinomas (lumbar nerve root, cauda equina, brachial plexus, trigeminal nerve). Multiple tumors of the same histology were seen in 5 rats (3 with oligodendroglioma, 2 with microglioma) and double tumors of different histology in 6 rats (1 cerebral glioblastoma + cerebellar medulloblastoma; 5/6 cerebral oligodendroglioma + medullary gangliocytoma, spinal microglioma or neurinoma of the spinal nerve roots, cauda equina or trigeminal nerve). No tumors of the nervous system were noted in untreated controls. Other lesions in MNU-treated rats included papillary hyperplasia and hyperkeratosis of the forestomach (44/44; with transformation to epidermoid carcinoma in 2/44), nephroblastic premalignant kidney lesions (2/44), renal cortical adenoma (1/44), fusiform type thymoma (1/44) and lymphosarcoma (2) or undifferentiated small cell carcinoma (1) of the lung. The high frequency of oligodendrogliomas in MNU-treated rats resembled their incidence in man.

69-281 ENHANCEMENT OF THE WATER SOLUBILITY OF 3,4-BENZPYRENE BY ADDITION OF 1,3,7-TRIMETHYLXANTHINE (CAFFEINE). (Ger.) Eisenbrand, J. (U. Saarland, Saarbrücken, Germany) and K. Emrich. Dtsch. Lebensmit-Rdsch. 64(7):217-218, 1968.

The solubility of an aqueous soln. of 3,4-benzpyrene (BP; 30 mg/3 ml acetone) in caffeine (5.82% soln.; final vol. 50 ml) + other additives was studied by spectrophotometry. The most effective additive to the BP + caffeine mixture was antipyrine (phenyldimethylpyrazolone; 10% soln.), which increased BP solubility to 592 mg/liter. Thiosinamine (5% soln.), urethan (10% soln.), urea (20% soln.) and thiourea (5% soln.) increased BP solubility to 540, 500, 330 and 345 mg/liter, resp. BP was slightly soluble in antipyrine soln. without caffeine (1.5×10^{-3} mg/liter). Addition of caffeine and the other additives did not extinguish the BP fluorescence.

69-282 CELLULAR COMPOSITION DURING TUMOR INDUCTION IN RATS BY CYCAD HUSK. (E.) Hoch-Ligeti, C. (George Washington U. Sch. Med., Washington, D. C.), E. Stutzman and J. M. Arvin. J. Nat. Cancer Inst. 41(2):605-614, 1968.

The carcinogenic effects of fresh or dried cycad nut husks (CN; *Cycas circinalis*; 2-10% in diet) were studied in weanling (60-70 g) or young adult (130-160 g) Sprague-Dawley rats of both sexes. Fresh CN was highly toxic, so the 10% diet was fed for 10 days and the 5% diet for 16 days; dried CN was significantly less toxic. The initial toxic effects of CN were independent of its carcinogenic effect, however, since all treated rats surviving 2 mo. developed cystic cholangiomas with a few hepatomas. Kidney tumors (clear cell or papillary carcinomas, sarcomas and Wilms' tumors) developed about 200 days after the beginning of CN feeding (2-10% fresh or dried CN husk) in all 2-mo. survivors sacrificed after that time. Additional tumors in 1 group fed 5% fresh CN husk included myeloid leukemia (1/5) and multiple mammary tumors (2 females) after about 210 days. No sex differences were noted. The first liver tumors were seen in 2 rats sacrifices after 124 days (which showed no renal tumors); the first kidney tumors were seen in 2 rats sacrificed after 206 days (both were large, therefore presumably of several wk. duration). Rats fed diets containing *Zamia debilis* leaves (2.5% or 10% in diet) for 1 yr. and over developed no tumors, although the total cycasin content of the leaves was higher than in fresh or dried CN husk; it is suggested that the active substance in these leaves was inactivated by an enzyme or other chemical present in the leaves before ingestion, or that it was not released in the rat intestine. In rats with CN-induced tumors, nuclear DNA and RNA were increased in the liver cells (it was not possible to examine normal and tumor tissue separately, because the tumors were multiple and small). DNA, nuclear RNA, nitrogen and β-glucuronidase were significantly increased in the kidney tumors, but not the normal kidney tissues; succinate dehydrogenase levels were reduced in the kidney tumors and the normal kidney tissue of tumor-bearing rats. Liver β-glucuronidase increased during but not after CN feeding; this change was apparently associated with detoxification and independent of carcinogenesis.

69-283 EFFECTS OF MULTIPLE PITUITARY HOMOGRAFTS OR PROGESTERONE ON 7,12-DIMETHYLBENZ(a)-ANTHRACENE-INDUCED MAMMARY TUMORS IN RATS. (E.) Welsch, C. W. (Michigan State U. East Lansing), J. A. Clemens and J. Meites. J. Nat. Cancer Inst. 41(2):465-471, 1968.

Female Sprague-Dawley rats underwent oophorectomy (oox.) and/or homologous pituitary transplantation (PG; 4 pituitaries implanted under the kidney capsule) at age 25 days; 1 group was admin. progesterone (P; 4 mg/day x 40 s.c.) beginning at age 30 days. All rats received dimethylbenzanthracene (DMBA; 5 mg x 1 i.v.) at age 55 days. No mammary tumors developed up to 150 days after DMBA admin. in rats undergoing oox. alone or + PG. In the other groups, the mammary tumor (adenocarcinoma) incidence (110 days after DMBA admin.) was 100% in intact controls, 73% in intact rats with PG and 79% in intact rats admin. P. The av. number of mammary tumors/rat was 12.2, 4.7 and 3.3, resp.; av. total tumor wt. was 16.2, 5.4 and 5.9 g, resp. The significant inhibition of DMBA mammary carcinogenesis by PG and P suggested that the inhibitory effects of the prolactin-secreting PG are at least partly indirect (a luteotropic action of prolactin on the ovary, stimulating P secretion). The total inhibition of DMBA carcinogenesis by oox. alone or + PG provided further support to the hypothesis that ovarian steroids are essential to carcinogen-induced mammary tumor development. Since P admin. just before DMBA treatment stimulates tumor development, it is suggested that the enhanced mammary gland development induced by prolonged P admin. (prior to DMBA admin.) reduced the susceptibility of the mammary gland to DMBA carcinogenesis.

69-284 TUMOR RNA AS A CARCINOGENIC AGENT. (Rus.) Khodosova, I. A. (Inst. Cytology U.S.S.R. Acad. Sci., Leningrad) and I. N. Shvemberger. Vop. Onkol. 14(6):68-69, 1968.

In C3HA mice treated i.p. with RNA from mouse ascites hepatoma AH-22 (non-viral) or normal mouse liver (0.2 mg every 2 days x 10, then 2-inj. courses at 2-wk. intervals; total 90 mg in 45 inj. over 12 mo.), the mean survival times were 20 mo. in both groups, compared to 19 mo. in saline-treated controls. Liver tumors developed in 9/20 (60%) and 10/20 admin. tumor and liver RNA, resp., compared to 8/19 (53%) of controls; mean survival times of tumor-bearing mice were 24, 22 and 21 mo., resp. The tumors were either hepatocellular "bare cell" adenomas, mixed "bare cell" adenoma and hepatoma (having alveolar or trabecular structures) or hepatomas (mostly highly differentiated). It is concluded that tumor cell RNA is not carcinogenic under these conditions.

69-285 EARLY CHANGES IN THE LUNGS OF MOUSE PROGENY DURING THE TRANSPLACENTAL ACTION OF URETHAN. (Rus.) Kolesnichenko, T. S. (Inst. Exp. Clin. Oncol. U.S.S.R. Acad Med. Sci., Moscow) Vop. Onkol. 14(6):83-88, 1968.

In Strain A mice born of mothers receiving urethan (U; 20-30 mg s.c.) 1-3 days before parturition, diffuse hyperplasia of the pulmonary alveolar epithelium and hyperplasia of the small and medium bronchi appeared 7-8 days after birth. By day 11-12 these changes were even more pronounced; by day 14-15, some mice showed conversion of focal proliferation of the bronchial epithelium into papilloma; at day 20-23, bronchial epithelial proliferation was very pronounced and focal proliferation of the alveolar epithelium was absent. Atelectasis and hyperemia of the pulmonary tissue was observed in all age groups, particularly at age 7-12 days. In the offspring of females admin. U (50-60 mg s.c.) 3-8 days before parturition, diffuse proliferation of the alveolar epithelium and focal proliferation of this tissue was seen on days 7-8 and 14-15, resp., and mouse showed an immature undifferentiated adenoma. On day 20-23, diffuse proliferation of the alveolar and bronchial epithelium was noted and 1 mouse developed multiple undifferentiated adenomas. Atelectasis and hyperemia were found at age 7-12 days. Of the offspring of mice admin. U (80-100 mg s.c.) 3-7 days before parturition, 1 showed an immature undifferentiated adenoma of the lung at age 14 days and 20-23-day-old mice showed diffuse and focal proliferation of the alveolar and bronchial epithelium; 4 mice showed adenomas (poorly differentiated or undifferentiated) and 1 mouse showed multiple adenomas.

69-286 ADMINISTRATION OF CHEMICAL COMPOUNDS WITH EMBRYONIC TISSUE AS A METHOD FOR DETERMINATION OF CARCINOGENESIS. (Rus.) Linnik, A. B. (Inst. Exp. Clin. Oncol U.S.S.R. Acad. Med. Sci., Moscow) Vop. Onkol. 14(5):56-61, 1968.

Possible enhancement of 7,12-dimethylbenz α anthracene (DMBA) or 20-methylcholanthrene (MC) carcinogenesis was studied in BALB/c mice, 4-5 mo. after admin. of the carcinogen + a suspension of skin cells from mouse embryos (ESS) at age 4-9 wk. ESS alone (s.c. implants) induced no tumors (20 mice) and s.c. inj. of DMBA (0.5 mg) induced a s.c. sarcoma in 1/6 (16.6%). ESS (0.04 ml) + DMBA (0.4 mg) induced tumors in 4/31 (12.9%) after s.c. inj. (3 sarcomas, 1 s.c. carcinoma with skin carcinoma). ESS (0.25 ml s.c.) + DMBA (0.5 mg s.c.) induced tumors in 9/20 (45%; 5 sarcomas, 2 skin cancers, 2 with both tumor types, 1/2 also with papilloma). After s.c. implantation of ESS + DMBA (doses not stated), 34/62 (54.8%) developed tumors (24 sarcoma + papilloma or premalignant skin lesions; 5 skin + mammary carcinoma; 5 s.c. sarcoma + skin carcinoma; 1 s.c. sarcoma + skin carcinoma + papilloma). ESS + MC implantation (doses not stated) induced tumors in 13/35 (36.7%; 8 sarcoma + papilloma, 3 skin + mammary carcinoma, 1 sarcoma + skin carcinoma, 1 sarcoma + papilloma + skin carcinoma). Admin. of MC + newborn mouse skin suspension (doses not stated) induced tumors in 5/18 (27.7%; 4 sarcoma, 1 papilloma + sarcoma + skin carcinoma). No tumors were seen in 61 untreated controls at age 7 mo. Embryonic skin cysts developed in 14 mice treated with ESS + MC (4/35), ESS alone (9/20) or MC + newborn skin suspension (1/18).

69-287 SARCOMAS OF THE EPIDIDYMIS INDUCED IN ALBINO RATS BY CARCINOGENIC HYDROCARBONS. (Rus.) Bobkov, A. G. (Pavlov Med. Inst., Leningrad, U.S.S.R.) Vop. Onkol. 14(5):93-95, 1968.

Treatment with 9,10-dimethyl-1,2-benzanthracene, 3,4-benzpyrene or methylcholanthrene (2 mg in oil or 3-3.5 mg pellet x 1 into epididymis) did not induce epididymal tumors in guinea pigs (39 or rabbits (22), but did induce tumors in 59 rats (40/59 treated bilaterally). Tumors of the epididymis developed in 32/46 (69.6%) rats surviving >6 mo., usually toward the end of the first and the beginning of the second yr.; these included 24 carcinomas, 1 malignant mesothelioma and 2 fibrosarcomas of the epididymis, 2 retroperitoneal fibrosarcomas, 1 carcinosarcoma (adenocarcinoma + fibrosarcoma after bilateral treatment), 1 mixed carcinosarcoma and leiomyosarcoma and 1 tumor of uncertain histology. Single regional metastases (probably lymphogenous) developed in 1/2 with fibrosarcoma and the rat with leiomyosarcoma. The agents inducing these tumors are not specified. The absence of the development of tumors in guinea pigs and rabbits verified the species difference in sensitivity to these carcinogenic hydrogens. Sarcomas of the epididymis in man are rare (13.6% of all epididymal tumors) and histologically varied; fibrosarcomas and leiomyosarcomas resembling those seen in man could be induced in rats.

69-288 ON THE EFFECTS OF BLASTOMOGENIC SUBSTANCES ON THE ORGANISM DURING EMBRYOGENESIS. (E.) Napalkov, N. P. (Petrov Res.

Inst. Oncol., U.S.S.R. Min. Pub. Health, Leningrad) V. A. Alexandrov. Z. Krebsforsch. 71(1):32-50, 1968.

Methyl- and ethylnitrosoaniline and 4 nitrosoureas (methyl-, dimethyl-, ethyl-, propyl-) were both embryotoxic and teratogenic to rats; potent carcinogens of the polycyclic hydrocarbon and symmetrical dialkylnitrosamine groups were highly embryotoxic but not teratogenic. Prenatal admin. of polycyclic hydrocarbons and urethan induced tumors in the offspring; in many cases the organotropism of the carcinogens (such as dimethylnitrosamine for the kidney) was the same in the offspring as in treated adult rats. In 1 study of successive generations of rats treated continuously with 6-methylthiouracil (MTU; throughout life, including pregnancy and lactation), the incidence of thyroid tumors was significantly above normal in generations 1-4 and 8-9 of random breeding and in generations 1-6 and 10-17 of inbreeding. In the intervening generations (5-7 and 7-9, resp.), the thyroid tumor incidence was about the same as in controls; the tumor incidence after generations 9 and 17, resp., was lower than in controls. Irrespective of the tumor incidence, the "goitrous" reaction and pituitary hyperplasia induced by MTU showed a steady decline, indicating that MTU carcinogenesis is not due to thyroid inhibition only. It is suggested that the nature of the teratogenic reaction to a carcinogen is determined not only by its organotropism, but lso by the stage of embryogenesis at the time of treatment. The risk of tumor development in the ffspring of carcinogen-treated animals depends n the relative sensitivity of embryonic tissues to the agent, the passage of the agent through the placenta, and possible development of carcinoenic metabolites formed in the embryo or transitted from the mother through the fetal membranes. renatal carcinogen application seems to alter he susceptibility to the same agent when admin. uring postnatal life, although non-teratogenic arcinogens may be less carcinogenic to the fetus. literature review (68 references) is included.

9-289 MORPHOGENESIS AND VARIETY OF ARSENIC-INDUCED PREMALIGNANT LESIONS.

(Ger.) undeiker, M. (U. Derm. Clin., Freiburg i. Br., ermany) and J. Petres. Arch. Klin. Exp. Derm. 31(4):355-365, 1968.

he pathology of 67 biopsy specimens from 23 pts. ith chronic arsenical keratosis (of iatrogenic r occupational origin) was studied. "Typical" rsenical keratosis was seen in 21/67 specimens, ransitional stages between arsenical keratosis nd Bowen's disease in 10/67 and Bowen's disease n 19/67; transformation of the premalignant leions into "bowenoid" or prickle cell carcinoma as seen in 7 and 3 lesions, resp. Carcinoma f uncertain cause was the final diagnosis in 10 ases (6 bowenoid, 4 prickle cell); the other 7 esions were basal cell carcinomas in areas of he skin exposed to sunlight (2) or X-rays (5).

The histological differential diagnosis of "typical" arsenical keratosis and flat "bowenoid" lesions, as compared to superficial basal cell carcinoma, was nearly impossible. Actinic and senile keratosis was easily identified by the atrophy and connective tissue degeneration, which were absent in the arsenical keratoses. It is suggested that premalignant arsenical keratoses are variations of the same lesion depending on local factors (melanin production, arsenic excretion by the sweat glands, etc.); the malignant tumors may show a bowenoid growth pattern (forming metastases, unlike the basal cell carcinomas), but the bowenoid pattern is not specific for arsenical cancers.

69-290 "CHROMOSOMAL PULVERIZATION" INDUCED BY ARSENIC ON CELL CULTURES IN VITRO.

(Ger.) Petres, J. (U. Derm. Clin., Freiburg i. Br., Germany) and M. Hundeiker. Arch. Klin. Exp. Derm. 231(4):366-370, 1968.

Peripheral lymphocytes from 20 normal persons (not previously exposed to arsenic), treated for 24-48 hr. with sodium diarsenite (As; 10^{-6} or 0.5×10^{-6} g/ml), showed a decreased mitotic frequency and "pulverization" of the chromosomes, the latter a phenomenon never seen in untreated control cultures. The number of Feulgen-positive nuclei also decreased in treated cultures. The As-induced chromosomal changes resembled those caused by demecolcine, 5-fluoro-2'-deoxyuridine and certain viruses, and may have followed partial or complete block of DNA or RNA synthesis. It is suggested that As-induced inhibition of purine base incorporation into DNA and RNA leads to inactivation of sulfhydryl group-containing enzymes, and that cells surviving this treatment progress to atypias, premalignant lesions and carcinoma.

69-291 ROLE OF BONE MARROW IN INDUCTION OF THYMIC LYMPHOMAS BY NEONATAL INJECTION OF 7,12-DIMETHYLBENZ(a)ANTHRACENE.

(E.) Ball, J. K. (U. Western Ontario, London, Canada) J. Nat. Cancer Inst. 41(2):553-558, 1968.

Newborn CFW/D mice were admin. dimethylbenzanthracene in gelatin soln. (DMBA; 12 μg in bone marrow recipients, 50 μg in marrow donors; s.c.) and some mice were admin. bone marrow cells (BMC) from DMBA-treated donors at age 10 days or <24 hr. (i.p.; usually 10^7 BMC). The incidence of thymic lymphoma was studied 110 or 160 days after DMBA admin. In 66 gelatin-treated controls, the tumor incidence was 1.5% at 160 days, compared to 0% in 94 mice admin. gelatin + BMC from DMBA-treated donors (treated at birth or age 10 days). In DMBA-treated mice admin. BMC from untreated donors or spleen cells from treated donors, the tumor incidence at 160 days was 41% and 45%, resp. In newborn mice admin. DMBA alone, the tumor incidence was 30-31% at 160 days, compared to 95% with an increased dose of DMBA (30 μg) and

20% in 7-day-old mice admin. DMBA (60 μg). In mice admin. DMBA neonatally, followed by BMC withdrawn from DMBA-treated donors, the tumor incidence at 160 days was 70%, 80% and 93% in 3 studies; heating the BMC reduced the tumor incidence to 35%. The tumor incidence in these mice increased linearly with the number of BMC admin. in 1 experiment. Since the lymphoma incidence in 7-day-old mice admin. a high dose of DMBA was low, the significant increase in tumor incidence found in mice transfused with BMC cells from treated donors was not attributed to transferred DMBA in the BMC preparation. The role of BMC from treated donors could not be determined.

69-292 EFFECT OF CHONDROITIN SULFATE ON THE GROWTH OF SOLID EHRLICH ASCITES TUMOR UNDER THE INFLUENCES OF OTHER INTERSTITIAL COMPONENTS.

(E.) Takeuchi, J. (Aichi-Gakuin U., Nagoya, Japan) Cancer Res. 28(8):1520-1523, 1968.

Male ddN or SMA mice were inoc. s.c. with Ehrlich carcinoma (8 x 10^6 cells) just after inj. of chondroitin sulfate (CS) into the same site (1 ml in saline) alone or + other chemicals; CS was admin. alone as a 20% soln. in collagen substrate + calf serum; the same conc. was used when CS was admin. in the presence of the other agents. Tumor wt. was studied 8 days later. CS alone stimulated tumor growth by 83% (compared to results in saline-treated controls); undiluted collagen and 2% fibrinogen alone reduced tumor wt. 20% and 30%, while hydroxyproline, egg albumin and muramidase alone (2% soln.) had no effect. CS + egg albumin, calf serum or muramidase did not stimulate tumor growth, but CS + collagen, hydroxyproline or fibrinogen increased tumor growth by 54%, 34% and 46%, resp. (compared to saline-treated controls). It is suggested that the inhibitory effects of egg albumin, calf serum and muramidase on the tumor-stimulating activity of CS result from a decrease in the negative electric charge of CS.

69-293 EFFECT OF LOW MOLECULAR WEIGHT DEXTRAN ON HEPATIC METASTASES IN THE RABBIT.

(E.) Fisher, B. (U. Pittsburgh Sch. Med., Pa.) and E. R. Fisher. Cancer Res. 28(8):1586-1589, 1968.

In female New Zealand rabbits admin. low molecular wt. dextran (D; 15 ml/kg of 10% saline soln. i.v.) 1 hr. before intraportal inj. of V2 carcinoma (50,000 cells) in D suspension, 14/14 animals developed liver tumors 8 wk. later; the livers were replaced in 3/14, 8/14 showed 1-2 nodules and 3/14 showed 5-9 nodules. Lung metastases developed in 6/14; 2/6 showed 3+ involvement (extensive involvement of all lobes), 3/6 showed 1+ involvement (few, scattered, small nodules) and 1/6 showed 2+ involvement (intermediate degree). In rabbits admin. saline 1 hr. before intraportal inoc. of tumor cells in saline, liver tumors developed in 7/14; the liver was almost replaced in 4/7 and contained 14 or more nodules in 2/7 and 1-5 nodules in 4/7. Lung metastases developed in 4/14 (1+ involvement in 2/4, 2+ and 3+ in 1/4 each). In animals admin. tumor cells in saline without prior treatment, liver tumors developed in 7/14 (1 nodule in 5/7, 5 nodules in 1/7, over 15 nodules in 1/7) and lung tumors in 2/14 (1+ or 3+ involvement). The mechanism by which D enhanced the formation of liver metastases was not known, but it was apparently not related to an anaphylactoid reaction to D.

69-294 HEPATIC CARCINOGENESIS IN CBA/Cb/Se MICE AND Cb/Se RATS BY ISONICOTINIC ACID HYDRAZIDE AND HYDRAZINE SULFATE.

(E.) Severi, L. (U. Perugia, Italy) and C. Biancifiori. J. Nat. Cancer Inst. 41(2):331-349, 1968.

In untreated CBA/Cb/Se mice, the incidence of liver tumors (hepatocarcinoma) was 4/37 (11%) in males and 2/47 (4%) in females, with av. induction times of 86 and 78 wk., resp. The incidence of lung tumors (adenoma or adenocarcinoma) in untreated mice was 1/37 in males and 4/47 in females (3% and 9%, resp.), with av. induction times of 102 and 61 wk., resp. In 8-wk.-old mice admin. isoniazid (INH; 2 mg/day x 36 wk. p.o.), the liver tumor incidence was about the same as in untreated controls (3/18 males, 2/17 females = 17% and 12%, resp.; av. induction times 60 and 83 wk., resp.), while the lung tumor incidence increased (11/18 and 13/17 = 61% and 76%, resp.; av. induction times 49 and 72 wk., resp.). The INH metabolite hydrazine sulfate (HS; 1.13 mg/day; aqueous solution) induced liver and lung tumors in 13/21 and 16/21 males (62% and 76%), resp., and in 15/21 and 19/21 females (71% and 90%, resp.), with av. induction times in males of 68 and 66 wk., resp., and in females of 61 and 60 wk., resp. In 8-wk.-old Cb/Se rats admin. INH (0.35% in drinking water = about 35 mg/day x 48 wk.) induced mammary fibroadenoma in 11/40 females (27.5%), with av. induction times of 45 wk.; in males, the incidence of lung and liver tumors was 2/49 (4.1%) and 1/49 (2%), resp., with av. induction times of 60 and 68 wk., resp. This dose of INH was highly toxic. HS (12 mg/day p.o.; same regimen as INH) induced liver tumors in 4/13 males (30.7%) after an av. of 85 wk.; no tumors developed in females. At 18 mg/day, HS induced lung tumors in 3/14 males (21.4%) and 5/18 females (27.7%) with av. induction times of 75 and 78 wk., resp. Untreated controls developed no tumors. The liver tumors in rats were hepatocarcinomas or spindle cell sarcomas; the lung tumors were adenocarcinomas. Mice eliminate INH more rapidly than man, so that these results cannot be compared directly to clinical results unless higher doses of INH are admin.; however, the possible increase in lung cancer in pts. admin. tuberculostatic doses of INH is mentioned.

69-295 INDUCTION OF HEPATOMAS BY 4-AMINOBIPHENYL AND THREE OF ITS HYDROXYLATED DERIVATIVES ADMINISTERED TO NEWBORN MICE.

(E.) Gorrod, J. W. (Royal Cancer Hosp., London), R. L. Carter and F. J. C. Roe. *J. Nat. Cancer Inst.* 41(2):403-410, 1968.

Newborn Swiss mice were treated with several biphenyl derivatives (200 μg/day s.c.) or dimethylbenzanthracene (DMBA; 20 μg/day s.c.) in 3% aqueous gelatin for the first 3 days of life. The over-all survival rates at age 48-52 wk. was 87.6%; the biphenyl derivatives were significantly less toxic than DMBA (39/49 survived). The incidence of hepatoma at 48-52 wk. in males and females with these compounds was: 4-aminobiphenyl = 19/20 and 4/23, resp.; 4-amino-3-hydroxybiphenyl = 12/19 and 0/29, resp.; 4-hydroxylaminobiphenyl = 14/19 and 3/33, resp.; 4-amino-4'-hydroxybiphenyl = 12/18 and 2/26, resp.; DMBA = 14/19 and 0/20, resp.; gelatin vehicle = 5/41 and 2/47, resp.; and untreated controls = 3/41 and 0/48, resp. DMBA also induced lung adenomas in 29/39 survivors, lymphomas in 7/39 (thymic in 3/7, generalized in 4/7) and a granulosa cell ovarian tumor in 1/20 females. In mice admin. the biphenyl derivatives, the incidence of other tumors (pulmonary adenoma, thymic or generalized lymphoma, splenic lymphosarcoma) was about the same as in controls (3/90 in untreated animals, 2/87 in gelatin-treated mice). The increase in hepatoma incidence induced by the biphenyl compounds was highly significant in males; in females, it was slight but probably significant with all compounds except possibly 4-amino-3-hydroxybiphenyl.

69-296 DIMETHYLNITROSAMINE-INDUCED HEPATIC CELL CARCINOMA IN RAINBOW TROUT.

(E.) Ashley, L. M. (West. Fish Nutrition Lab., Cook, Wash.) and J. E. Halver. *J. Nat. Cancer Inst.* 41(2):531-552, 1968.

In trout fed dimethylnitrosamine (DMN; 7.5-1920 mg/100 g dry wt. diet) for 9 mo. or more, small white spots were seen in the liver at all doses. A small number of internal nodules developed in fish admin. 30 or 120 mg/100 g of DMN after about 1 yr. of treatment. Liver tumors (adenoma or adenocarcinoma) were seen in 38/51 and 65/65 admin. 480 and 1920 mg/100 g of DMN, resp.; no sex difference was noted. At 480 mg/100 g, the tumor incidence was high after 16-20 mo. and 3/10 showed small tumors after 9 mo. All fish admin. the highest dose of DMN died within 20 mo. and well-developed tumors were seen after 12 mo. The liver tumors were grossly and histologically similar to DMN-induced tumors in rats and other mammals, but tumor-bearing fish seldom developed ascites, metastases or extensive proliferation of the bile ducts nd ductules. DMN-induced liver tumors sometimes pread to the pancreatic adipose tissue or viseral fascia. Some tumors showed acinous-like ormations, not related to bile duct proliferaion, progressing to cystic areas; the large tuors often became necrotic. Untreated control ish developed no liver tumors.

69-297 A COMPARATIVE *IN VITRO* AND *IN VIVO* STUDY OF INDUCED CERVICAL LESIONS OF MICE.

(E.) Park, H.-Y. (Hahnemann Med. Coll., Philadelphia, Pa.) and I. Koprowska. *Cancer Res.* 28(8):1478-1489, 1968.

Virgin female C3H/HeJ mice (4-6 wk. old) were treated with 3,4-benzpyrene (BP; 1% acetone soln.) for 1-5 mo. by cervical painting. No cervical dysplasia or carcinoma developed after 12-16 mo. of observation in 20 untreated controls; 3/20 acetone-treated controls developed cervical dysplasia after 3-4 mo. of treatment, but no carcinomas developed. Cervical dysplasia was seen in 7/12 admin. BP for 3-4 mo. and 0/18 treated for 1, 2 or 5 mo. Carcinoma *in situ* developed in 4/12 treated for 4-5 mo. and 0/18 treated 1-3 mo. Invasive carcinoma developed in 5/6 treated for 5 mo. and 0/24 treated for 1-4 mo. Invasive carcinoma was seen in 20/20 mice followed up for 12-16 mo. after 1-5 mo. courses of BP. Epithelial cells from the cervix of 23 BP-treated mice were established *in vitro*; 14 cultures were transformed *in vitro*, but none induced tumors upon repeated transplantation. Transplantation of BP-induced benign cervical lesions (into isologous recipients) induced mucoepidermoid cysts; transplanted early cervical carcinomas developed into malignant tumors, and s.c. transplanted squamous cell carcinomas developed into sarcomatous tumors after several passages. Malignant transformation of BP-induced cervical lesions was demonstrable only by direct transplantation studies; the immediate capacity of BP-treated epithelial cells to undergo transformation *in vitro* seemed to be independent of their tumor-forming capacities. It is suggested that *in vivo* transformation depends on the coexistence of epithelial cells and fibroblasts.

69-298 ADRENOCORTICOLYTIC ACTION OF 7,12-DIMETHYLBENZ(ALPHA)ANTHRACENE IN RATS. I. CAN GONADAL FUNCTION INFLUENCE ADRENAL SUSCEPTIBILITY TO THE TOXIN?

(It.) Colafranceschi, M. (U. Florence, Italy) and P. Tosi. *Arch. De Vecchi Anat. Pat.* 49(2):541-564, 1967.

The acute (72-hr.) toxicity of 7,12-dimethylbenz(α)anthracene (DMBA; 20 mg/100 g x 1 p.o. in oil) to the adrenal was studied in 48-50-day-old Sprague-Dawley rats, some of them treated by oophorectomy (oox.), orchiectomy (orx.), estradiol (E; 50 μg/100 g/day x 4 s.c.) and/or testosterone propionate (TP; 1 mg/100 g/day x 4 s.c.) 4 days before DMBA. Adrenocortical necrosis was seen in 7/8 intact females and 6/8 intact males admin. DMBA; previous hormone treatment did not significantly modify this response. The 3-day mortality rate was 2/8 in orx. males, 1/8 in 3 other groups (males admin. E, oox. females, oox. females admin. E) and 0/8 in the other groups (intact males or females, females admin. TP or E, males admin. TP, orx. males admin. E). DMBA-treated females showed necrosis of the ovarian corpora lutea; DMBA-treated males showed a reduction in the number of spermatogonia, but other testicular cells (including the Leydig cells) were normal. Ovarian and testicular histology was not examined in the other treated groups. It is concluded that the specificity of DMBA towards the zona reticularis and zona fasciculata of the rat adrenal cortex is not modified by this hormonal treatment.

69-299 POTENTIATING EFFECT OF VITAMIN A ON 9,10-DIMETHYL-1,2-BENZANTHRACENE CARCINOGENESIS IN THE HAMSTER CHEEK POUCH. (E.) Levij, I. S. (Hebrew U., Jerusalem) and A. Polliack. Cancer 22(2):300-306, 1968.

Male Syrian golden hamsters (age 1.5-2 mo.) were treated for 2-12 wk. by cheek pouch painting (3 doses/wk.) with 9,10-dimethyl-1,2-benzanthracene (DMBA; 0.5% soln.) alone, DMBA + vitamin A palmitate (VA; 10% soln.) or VA alone (all in paraffin soln.). Intraepithelial carcinoma developed in the DMBA group after 6 wk. and infiltrative squamous cell carcinoma by 8 wk. In animals admin. DMBA + VA, atypical epithelial changes were already evident after 4 wk. and foci of invasive carcinoma after 6 wk.; after 8 wk., the foci of carcinoma were larger and more anaplastic than in the group receiving DMBA alone. Pouches treated with VA alone showed acanthosis and eventually moderate epithelial pleomorphism. It is suggested that a factor of site specificity is involved in the effect of VA on chemical carcinogenesis and that the earlier development and greater incidence of carcinomas in animals treated with VA + DMBA may be the result of an addition of VA-induced epithelial hyperplasia and the carcinogenic effect of DMBA. It is also possible that VA-enhanced permeability of cellular and subcellular membranes facilitates the entry of DMBA into the cells, thus potentiating its carcinogenic effect.

69-300 INDUCTION OF HEPATOMA AND SYSTEMIC AMYLOIDOSIS IN MICE BY 4-(DIMETHYLAMINO)AZOBENZENE FEEDING. (E.) Akamatsu, Y. (Osaka U. Med. Sch., Japan) and R. Ikegami. Gann 59(3):201-206, 1968.

Hepatoma induction by 4-(dimethylamino)azobenzene (DAB; 0.06% in diet) was studied in 2 strains of mice with high or low spontaneous hepatoma incidence (C3H/HeOs and C57BL, resp.). After 1 wk. or 1 mo. of DAB feeding, the hepatoma incidence in evaluable C57BL mice was 0%, but 2/10 and 3/6, resp., developed systemic amyloidosis after 60-76 wk. of observation. In the C3H/HeOs mice, the tumor incidence after 1 wk. and 1 mo. of DAB admin. (45-50 and 61-64 wk. of observation) was 1/19 and 1/9, resp. After 5 mo. of DAB admin. (56-62 wk. of observation), the hepatoma incidence in C3H/HeOs and C57BL mice was 3/5 and 2/15, resp., a significant increase over the incidence in untreated controls (102/323 and 1/143 = 31.6% and 0.6%, resp.). The DAB-induced hepatomas were grossly and microscopically identical to spontaneous hepatomas.

69-301 INDUCTION OF MALIGNANT LYMPHOMA AND OTHER TUMORS DURING EXPERIMENTS WITH ANTHRALIN PAINTING OF MICE. (E.) Yasuhira, K. (Kyoto U., Japan) Gann 59(3):195-200, 1968.

Tumor induction in 8-wk.-old dd, CFW or ICR mice by urethan (U; 40 mg x 3 i.p.) and skin painting (5 doses/wk. x 28 wk.) with 0.1% croton oil (CO) or 1,8,9-anthracenetriol (dithralin; anthralin; A) and in 6-wk.-old ICR mice by U (50 mg x 1) + CO or A (as above) was compared. The skin papilloma incidence after admin. of CO, A, U + CO and U + A was 6/22, 0/31, 7/23 and 0/24, resp., in dd mice; 2/20, 1/20, 16/20 and 8/20, resp., in CFW mice; and 6/60, 0/60, 38/60 and 7/60, resp., in ICR mice (4/40, 0/40, 24/40 and 2/40, resp., in the younger group). U alone did not induce skin tumors. U alone induced lung adenomas in a high percentage of mice (39/43 dd, 19/20 CFW, 16/20 older and 36/40 younger ICR mice, resp.); the lung tumor incidence was lower with CO or A alone (2/22 and 14/31, resp., in dd; 12/20 and 4/20, resp., in CFW; 1/60 and 0/60, resp., in ICR), but increased with U + CO (14/23 dd, 16/20 CFW, 9/20 older and 37/40 younger ICR) and U + A (8/24, 14/20, 13/20 and 31/40, resp.). Thymomas developed in 2 dd mice admin. U + CO or U + A and in 1/20 CFW mice admin. U alone; lymphoma developed in 1/20 CFW mice admin. U + A. The incidence of thymoma and leukemia in ICR mice (in parentheses, the incidence in the younger group) was 7/60 and 0/60 (3/40 and 0/40), resp., with U; 0/60 and 0/60, resp., with CO, 1/60 and 9/60 (0/40 and 6/40), resp., with A, 2/60 and 1/60 (0/40 and 0/40), resp., with U + CO and 3/60 and 28/60 (0/40 and 21/40), resp., with U + A. Mammary carcinomas developed in 1/31 dd mice admin. A and 2 older ICR mice admin. U + CO or U + A. The high mammary carcinoma incidence in CFW mice (10/20 in each combined treatment group; 9/20, 8/20 and 6/20 admin. U, CO and A, resp.) was attributed to spontaneous tumor development.

69-302 SKIN PAPILLOMA PRODUCTION BY ANTHRALIN PAINTING AFTER URETHAN INITIATION IN MICE. (E.) Yasuhira, K. (Kyoto U., Japan) Gann 59(3):187-193, 1968.

Several groups of mice were admin. urethan (U; 50 mg x 1 or 40 mg x 3 i.p.) followed by acetone soln. of 0.1% croton oil (CO) or 1,8,9-anthracenetriol (anthralin; dithralin; A; 0.033% or 0.1%) for 28 wk. (5 doses/wk.). No skin papillomas developed in U + acetone-treated controls. In 8-wk.-old ICR mice, no skin tumors developed with CO or A alone; U + A and U + CO induced tumors in a 2-phase curve (with a peak and a plateau at 15 wk., followed by another increase), with a cumulative skin tumor incidence of about 35% and 65%, resp., at the end of the study (28 wk.). ICR mice were more susceptible to skin tumor induction when treatment was begun at age 6 wk., but the cumulative tumor incidence with A alone or + U was under 20%, compared to about 25% with CO alone and 85% with U + CO. CFW mice (6-8 wk. old) were much more susceptible to papilloma induction than ICR mice, particularly with U + A and U + CO (cumulative incidence about 75% and 90%, resp.); the tumor incidence with A and CO alone was about 10% and 20%, resp. Animals admin. A alone or + U unexpectedly developed malignant lymphomas, pulmonary adenomas, thymomas and splenic leukemia (no other details). The av. number of tumors/mouse rose to a peak 8-16 wk. after the appearance of the first tumors (depending on age, strain and carcinogen dosage) and then decreased; this tumor regression was tentatively attributed to delayed tumor immunity.

69-303 CARCINOGENICITY IN THE HAMSTER OF SIMULTANEOUSLY ADMINISTERED 2-ACETAMIDOFLUORENE AND 3-METHYLCHOLANTHRENE. (E.) Enomoto, M. (U. Tokyo, Japan), M. Miyake and K. Sato. Gann 59(3):177-186, 1968.

In 8-wk.-old male golden hamsters fed for 10 mo. with diets containing 3-methylcholanthrene (MC; 0.02%) or 2-acetamidofluorene (AAF; 0.03%) or both (same doses), followed by a normal diet, all animals surviving 8 mo. or more of AAF feeding developed marked hyperplasia of the intrahepatic bile ducts and 5/10 fed AAF alone developed benign cystadenomas of the bile ducts. AAF + MC also induced bile duct hyperplasia, but it was less marked than with AAF alone. The only significant change in the liver with MC alone was bile duct hyperplasia in 1/10. No liver or bile duct tumors developed in untreated controls or animals admin. MC alone. Adenomas of the intrahepatic bile ducts were induced by AAF + MC in 4/10. Inflammation and necrosis of the jejunal epithelium was seen in 1/10 admin. AAF alone and papillary hyperplasia in 2/10 admin. AAF + MC. Malignant tumors were seen only with AAF + MC: 1 bile duct carcinoma, 1 undifferentiated pancreatic adenocarcinoma and 3 mesenteric sarcomas (polymorphocellular, liposarcoma, mesothelioma). In these animals, the principal urinary metabolites of AAF were 7-hydroxy-, N-hydroxy- and 5-hydroxy-AAF (in decreasing order at all times). No constant increase in N-hydroxy-AAF excretion was seen with AAF + MC (compared to AAF alone), but addition of MC increased the excretion of the N-hydroxylated and ring-hydroxylated AAF metabolites (in contrast to results seen in rats), during the early stages of treatment. In another group of hamsters fed AAF (0.03%), MC (0.02%) or AAF (0.03%) + MC (0.003% or 0.02%) for 6-20 wk., all AAF-treated animals (with or without MC) developed intrahepatic bile duct hyperplasia. Cholangiofibrosis developed in all animals fed AAF alone for 20 wk.; it was moderate with AAF alone or + the higher dose of MC and minimal with AAF + the low dose of MC. Renal tubular degeneration was seen in some MC-treated animals, but no changes in other organs (including liver cell hyperplasia or cirrhosis) were noted. Addition of MC to AAF did not increase in vitro hepatic N-hydroxylation of AAF, but the synergism of MC and AAF in tumor induction in extrahepatic tissues was attributed to enhancement by MC of N-hydroxylation of AAF in the extrahepatic tissues.

69-304 METABOLISM OF 4-NITROQUINOLINE-1-OXIDE. IV. QUANTITATIVE DETERMINATION OF IN VIVO CONVERSION OF 4-NITROQUINOLINE-1-OXIDE IN SUBCUTANEOUS TISSUE OF RAT. (E.) Matsushima, T. (Nat. Cancer Ctr. Res. Inst., Tokyo), I. Kobuna, F. Fukuoka and T. Sugimura. Gann 59(3):247-250, 1968.

The metabolic breakdown of 4-nitroquinoline-1-oxide (NQO; 10 mg = 56 μmoles x 1 s.c.) in the s.c. tissues of male Donryu rats was studied after 30 min.-24 hr. NQO disappeared rapidly from the s.c. tissue (14.0-20.8 μmoles at 30 min., 7.0-14.6 μmoles at 1 hr., 5.4-6.8 μmoles at 3 hr., 0 thereafter), as a result of enzymatic reduction, removal by the circulating blood, binding by -SH compounds and possibly hydroxylation. Enzymatic reduction of NQO yielded 4-hydroxyaminoquinoline-1-oxide (HAQO), which reached max. levels (3.4-5.8 μmoles = about 9% of the NQO dose) after 1 hr., remained at this level until 14 hr., then declined slowly; it was still detectable after 24 hr. (0.9-2.7 μmoles). HAQO was converted slowly to 4-aminoquinoline-1-oxide (AQO), which remained in the tissue at the inj. site at about the same levels (0.11-0.22 μmoles) throughout the experiment. It is suggested that the prompt formation and prolonged retention of HAQO (a powerful carcinogen believed to be a proximate carcinogen) and its slow conversion to the non-carcinogenic AQO provide favorable conditions for NQO carcinogenesis.

69-305 HISTOGENESIS OF CHOLANGIOFIBROSIS AND WELL-DIFFERENTIATED CHOLANGIOCARCINOMA IN SYRIAN HAMSTERS GIVEN 2-ACETAMIDOFLUORENE OR 2-DIACETAMIDOFLUORENE. (E.) Reuber, M. D. (NCI, Bethesda, Md.) Gann 59(3):239-246, 1968.

Liver and bile duct lesions induced by continuous feeding of diets containing 2-acetamidofluorene (AAF; 0.025%) or 2-diacetamidofluorene (DAAF; 0.015%) were studied in male and female hamsters; some were sacrificed after 12 or 24 wk. and the others were followed until death. Pathological changes in the intrahepatic bile ducts were classified as proliferation (Stage A), cholangiofibrosis with or without atypical cells (Stage B), small cholangiocarcinomas (under 5 mm in diameter; Stage C) and large cholangiocarcinomas with or without metastases (Stage D). Changes in liver parenchymal cells were classified as hyperplasia (Stage A), small or large carcinomas (Stages B and C) and cirrhosis (Stage D). The max. change in the parenchymal cells of controls (observed up to 24 wk.) was Stage A; no pathological changes were seen in the liver. In

AAF-treated animals (all male), max. bile duct changes were Stage A after 12 wk. (6/6); Stages A and B in 3/6 and 3/6, resp., after 24 wk.; Stages A, B, C and D in 1, 6, 1 and 2/10, resp. (no metastases were seen) after 38 wk.; and Stages B, C and D in 4, 3 and 2/9, resp. (1 with metastases) after 44 wk. Max. changes in liver cells were Stage A (3/6) after 24 wk., Stages A and D (8 and 10/10, resp.) after 38 wk. and Stages A, B, C and D (3, 3, 2 and 9/9, resp.) after 44 wk. In females admin. DAAF for 49 wk., Stage B, C and D changes appeared in the bile ducts in 4, 1 and 3/8, resp. (1 developed metastases) and Stage A, B and D changes in the liver in 3, 4 and 8/8, resp. In males admin. DAAF for 50 wk., bile duct pathology was classified as Stage A, B, C and D in 2, 6, 1 and 1/10, resp., while liver lesions were classified as Stage A, B and D in 7, 2 and 10/10, resp. No Stage C liver lesions (large carcinomas) developed in DAAF-treated animals. Few of the Stage A lesions progressed to carcinomas; most developed degenerative changes. Both cholangiofibrosis and cirrhosis preceded the development of cholangiocarcinoma.

69-306 NATURE OF THE BINDING OF CARCINOGENIC AMINOAZO DYES WITH LIVER PROTEINS. X. FURTHER EVIDENCE ON THE NATURE OF BINDING BETWEEN AMINOAZO DYES AND LIVER PROTEINS, WITH SPECIAL REFERENCE TO THE SITE OF BINDING. (E.) Matsumoto, M. (U. Tokyo, Japan), H. Takata and H. Terayama. Gann 59(3):231-238, 1968.

Liver protein binding was studied in Wistar rats treated with 3,5-dimethyl-4-(dimethylamino)azobenzene (I) or 3,5-dimethyl-4-aminoazobenzene (II; 0.5 or 1.0 μmole x 1 p.o.) and in Wistar rats and ddN mice treated with 4-amino-2,3-dimethylazobenzene (III; 25 mg in rats, 5 mg in mice). Although I has methyl substitutions at positions 3 and 5 and III has no N-methyl group, both I and III gave rise to appreciable amounts of protein-bound dyes. Polar dyes from I and III apparently contained a sulfur-containing amino acid (probably methionine) and a 4-amino group of a secondary type; prolonged alkalinization of both polar dyes yielded non-polar dyes containing a primary auxochromic amino group. Polar dyes from 4-(dimethylamino)azobenzene and its 3'-methyl derivative yielded non-polar dyes with secondary auxochromic amino groups as the major products after alkalinization. It is suggested that the amino acid residue may be bound to the azo dye at the site of the 4-amino nitrogen of I and III.

69-307 ORGAN DISTRIBUTION OF 3-METHYLCHOLANTHRENE AFTER REPEATED PAINTING AND ORAL ADMINISTRATION IN RELATION TO THE INDUCTION OF LEUKEMIA IN MICE. (E.) Irino, S. (Okayama U. Med. Sch., Japan), T. Sezaki, J. Moriya and K. Hiraki. Gann 59(3):223-229, 1968.

In RF mice treated with 3-methylcholanthrene (MC), either p.o. (0.8% oil soln.; 3 doses/wk. of 0.15 ml x 12 wk.) or by painting (2 doses/wk. of 0.5% benzene soln. x 4 mo.), urinary MC excretion in both cases accounted for about 3% of the total dose, most of it in the first 24 hr. after a single dose. In p.o. treated mice, MC distribution was greatest in the bone marrow, spleen, thymus and lymph nodes after 2-12 wk. of treatment (MC levels in the heart were also high after 12 wk.). MC distribution after painting was highest in the bone marrow, followed by the thymus, lymph nodes, spleen and salivary gland. The MC levels in the lung were also high. MC levels in liver, kidney and stomach were low. MC levels in the bone marrow and other hematopoietic organs (lymph nodes, thymus, spleen) increased in mice developing lymphatic leukemia (after 13 wk. of treatment) and in the bone marrow and thymus of mice developing myeloid leukemia (after 19 wk.). However, the distribution of MC in C3H mice, which did not develop leukemia, was the same as in the RF mice. Since MC-induced leukemia in RF mice contains virus particles and can be transmitted by cell-free filtrates, it is suggested that MC leukemogenesis in these mice results from activation of a latent virus.

69-308 EXPERIMENTAL COMPARISON OF THE CARCINOGENIC ACTIVITY OF VARIOUS TOBACCO EXTRACTS AND TOBACCO SMOKE CONDENSATES IN RATS. (Ger.) Schmähl, D. (German Cancer Res. Ctr., Heidelberg, Germany). Arzneimittelforschung 18(7):814-817, 1968.

Extracts of Virginia, Burley, oriental, blend B mixture, black and oriental tobaccos were admin. (0.05 g/wk. s.c., total 3.2 g) to Br 46 male rats, in the form of alcoholic tobacco extracts (ATE), tobacco smoke condensates (TSC) and smoke condensates of ATE. TSC induced local sarcomas in about 23% of the animals, while the tobacco extracts were practically not carcinogenic. Local sarcomas were induced by TSC in 114/500 (22.8%), by smoke condensate from ATE in 139/500 (24.8%) and by ATE itself in only 6/500 (1.2%). There was no significant difference between the carcinogenic effect of the untreated TSC and smoke condensate from ATE. TSC and ATE derived from Burley tobacco induced local sarcomas in 9/100 and 1/100, resp.; the smoke condensate from ATE was as carcinogenic as condensates from the other tobaccos. No other strain differences were noted. There seemed to be no relationship between the 3,4-benzpyrene (BP) content of TSC and its carcinogenic activity. Reduced levels of nicotine and phenol were seen in smoke condensates from ATE than in untreated TSC, but the BP content was the same in both. Malignant tumors which were not locally induced developed in 2.9% of the control animals, 2.8% admin. ATE, 1% of rats inj. with TSC and 3% treated with smoke condensates of ATE; most of these were mammary sarcomas (5/281 controls, 6/1500 treated) or leukemias (no controls, 8/1500 treated). Other tumors included reticulum cell sarcoma or ovarian carcinoma (each 1/281 controls), reticulosis or sarcoma of the uterus or oral cavity (1, 1 and 3/500, resp., admin. ATE), mammary carcinoma (3/500 admin. ATE, 4/500 admin. smoke condensate from ATE), lung sarcoma (1/281 controls, 1/500 admin. ATE), lymphosarcoma or hemangiosarcoma of the kidney (each 1/500 admin. TSC), and uterine carcinoma or sarcoma of the omentum or bone (3, 1 and 1/500, resp., admin. smoke condensate from ATE).

69-309 THE CARCINOGENIC ACTION OF MINERAL OILS: A CHEMICAL AND BIOLOGICAL STUDY.

MRC Carcinogenic Action of Mineral Oils Committee. Publ: Her Majesty's Stationery Office, London, 1968, pp. 1-251.

Results of many skin painting experiments in "Clark 0.1" albino mice (males and females) and male short haired Old English strain rabbits are summarized. The mice usually received 2 dose/wk. of a petroleum fraction for 25 wk.; the rabbits received 1 dose at several sites (ears, thoracic or interscapular skin). Carcinogenic activities of petroleum fractions were compared to those of 9,10-dimethyl-1,2-benzanthracene. In both mice and rabbits, fractions of oil from Lagunillas, Venezuela (L; naphthenic type) were more active than fractions of an asphaltic-paraffinic oil from Kuwait (K), while a paraffinic oil from Oklahoma (O) had little activity. Very few tumors appeared in the mice, even in long-term tests (40 wk. or more), but the rabbits showed a higher tumor incidence (at 100/735 possible sites in 1 study). The K oil fractions contained several polycyclic aromatic hydrocarbons and heterocyclic compounds, including chrysene, fluorene, pyrene, phenanthrene, dibenzothiophene, 11-thiabenz(a)-fluorene and carbazole derivatives. The higher-boiling fractions of K oil contained many 1,2-benzanthracenes (possibly including an impure specimen of 6,7-dimethyl-1,2-benzanthracene, which was moderately active in rabbits) and some other compounds approaching the known carcinogenic hydrocarbons in complexity. High conc. of carcinogen was obtained by solvent extraction and benzene-methanol elution from alumina, with a possible 100-170-fold conc. after the formation and later decomposition of maleic anhydride adducts.

69-310 MAMMARY TUMOR FORMATION WITHIN OUTGROWTHS OF TRANSPLANTED HYPERPLASTIC NODULES FROM CARCINOGEN-TREATED RATS. (E.)

Beuving, L. J. (U. California, Berkeley). J. Nat. Cancer Inst. 40(6):1287-1291, 1968.

Mammary gland ducts and hyperplastic alveolar mammary nodules from Lewis rats treated with 7,12-dimethylbenzanthracene (DMBA; 20 mg) were transplanted into gland-free mammary fat pads of isologous rats 100-175 days after DMBA admin. Mammary adenocarcinomas developed in 8/37 of the resulting hyperplastic outgrowths within 11-52 wk.; the tumor incidence was the same (21-23%) in recipients receiving the transplants at age 3 wk. or 12 wk. No tumors developed in the host mammary glands or in transplanted outgrowths from untreated rats. It is concluded that hyperplastic alveolar nodules in DMBA-treated rats are premalignant.

69-311 IN VITRO STUDIES OF IMMUNE REACTIONS AGAINST AUTOCHTHONOUS AND SYNGENEIC MOUSE TUMORS INDUCED BY METHYLCHOLANTHRENE AND PLASTIC DISCS. (E.)

Hellström, I. (U. Washington Sch. Med., Seattle), K. E. Hellström and G. E. Pierce. Int. J. Cancer 3(4):467-482, 1968.

Inbred C3H and BALB/c mice were implanted with 0.45 μ Millipore filter pellets impregnated with 3-methylcholanthrene (MCA; 0.1 mg) pellet s.c. or i.m.) or s.c. with a 10 x 10 mm sheet of blue Dictabet. Fibrosarcomas appeared at the inj. site after approx. 3 mo. A colony inhibition (CI) method was used to demonstrate lymph node cell (LNC) and serum-mediated immune reactions against the induced sarcoma-specific transplantation antigens. LNC from mice whose primary sarcomas had been removed 3-8 days previously inhibited colony formation by autochthonous tumor cells; mean CI with 5 x 10^6 LNC/dish was 65.8 ± 8.6% (compared to controls). LNC from allogeneic donors caused 40-60% CI if added with phytohemagglutinin (PHA) and <20% without PHA. A mean CI of 67.5% was seen with LNC (5 x 10^6) from mice with previously excised transplanted MCA tumors. LNC from tumor-bearing mice caused 52.8 ± 7.8% CI with 5 x 10^6 LNC/dish, suggesting that MCA tumors may grow progressively in vivo even though LNC from these tumor-bearing animals can kill their cells in vitro. LNC from mice transplanted with crude suspension of target cells caused 45.7 ± 8.7% CI, 3 days after tumor transplantation. Approx. equal CI was obtained with LNC from mice inoculated with X-irradiated (15,000 r) sarcoma cells. Sera from these mice showed cytotoxic antibodies only rarely. Multiple immunizing doses of heavily irradiated MCA or plastic disc-induced tumor cells were more effective than single doses. Repeated immunization raised the level of cytotoxic humoral antibodies, but did not increase the LNC-mediated immune response.

69-312 EFFECT OF TEMPERATURE ON THE PRODUCTION OF INDUCED RAT MAMMARY TUMORS. (E.)

Young, S. (Imperial Cancer Res. Fund, London) Nature (London) 219(5160):1264-1265, 1968.

Non-inbred, specific pathogen-free rats were maintained at high temperature (32° C = 90° F) or low temperature (5° C = 40° F), on a standard diet and equal periods of light and darkness, from age 28 days. A single dose of 9,10-dimethyl-1,2-benzanthracene (DMBA; 30 mg p.o. in corn oil) was admin. at age 50 days. The rats were examined for mammary tumors from age 4 wk.; all tumors were removed when reaching 1 cm in diameter.

All animals were sacrificed after 142 days. The earliest mammary tumors appeared 5.5 wk. after DMBA admin. in the high-temperature group and 2 wk. later than this in the low-temperature group. The total mammary tumor (adenocarcinoma) incidence at 60, 80, 100 and 120 days after DMBA admin. was 10/40, 17/40, 23/40 and 26/39, resp., in the high-temperature group, compared to 3/39, 7/39, 15/39 and 16/39, resp., in the low-temperature group. All differences were highly significant.

69-313 CARCINOGENICITY OF TOBACCO SMOKE CONDENSATE TO MOUSE SKIN. (E.) Davies, R. F. (Tobacco Res. Council Labs., Harrogate, England) and T. D. Day. Nature (London) 219(5159):1183, 1968.

Discrepancies in the results of American and British experiments in mice admin. tobacco smoke condensate (TSC) by skin painting are discussed. In American studies, the skin carcinoma incidence was much higher (44.4% in 1 study of 81 mice) than the incidence reported in several British studies (3-5%). In 1 British experiment in 1962, of 3 groups of mice (660 mice/group) painted with TSC at 75, 150 and 300 mg/wk., the total tumor incidence was 5.8%, 13.3% and 32.6%, resp. (carcinomas in 1.1%, 4.4% and 14.9%, resp.). In 2 other studies performed in 1964 (240 mice) and 1966 (165 mice treated for 92 wk.; 4/165 survived) admin. high doses of TSC (300 mg/wk.), the total tumor incidence was 29.6% and 36.4%, resp. (carcinomas in 15.4% and 13.3%, resp.). A possible reason for this discrepancy was that American workers, to prolong the survival time until tumors developed, changed the painting regimen in the later stages by admin. of nicotine-free extracts or by painting TSC only on the developing skin lesions (instead of the entire skin of the back).

69-314 CARCINOGENIC AND CHRONIC EFFECTS OF 4,4'-DIAMINODIPHENYLMETHANE, AN EPOXY-RESIN HARDENER. (E.) Schoental, R. (MRC Labs., Carshalton, Surry, England) Nature (London) 219(5159):1162-1163, 1968.

In rats (unspecified strain) treated for about 8 mo. with 4,4'-diaminodiphenylmethane (DDM; about 20 mg x 4-5 doses p.o.) and followed until death, various signs of chronic liver toxicity (fibrosis, portal infiltration, etc.) were seen in most rats. A hepatoma and a hemangioma-like liver tumor developed 18 mo. after the first DDM dose in 1/8 males; 1/8 females, surviving 24 mo. after the first dose, showed a uterine adenocarcinoma at autopsy. Chronic exposure to DDM is known to cause liver damage and some liver tumors in rats; cats admin. DDM develop liver damage and blindness. DDM also induces liver damage in man; in 1965, 85 persons developed jaundice (sometimes severe) after eating bread made from flour accidentally contaminated by DDM. The structural similarity between DDM and the aminofluorene derivatives is apparently accompanied by a similar biological action. Since DDM has been used for over 20 yr. as an epoxy resin hardener in the rubber industry, caution in occupational exposure to DDM is recommended.

69-315 ONCOGENESIS OF PLASMACYTOMA (LPC-1) BY SPLEEN HOMOGENATE FROM A BALB/c MOUSE WITH A MINERAL OIL-INDUCED TRANSPLANTABLE TUMOR (HIPA) WITH PLASMA CELL EVOLUTION. I. BIOLOGY AND HISTOLOGY. (Ger.) Pedio, G. (U. Zürich, Switzerland), E. Grieshaber and J. R. Rüttner. Path. Microbiol. (Basel) 31(5):278-286, 1968.

A series of i.p. inj. of incomplete Freunds' adjuvant (vol. and number of inj. not stated) induced peritoneal plasmacytomas in 3 female BALB/c mice after a 9-12-mo. latent period. Assuming that incomplete adjuvants activate latent oncogenic viruses in the RES, the tumor-inducing effects of spleen homogenates from mice treated with adjuvants were tested (by i.p. inj. 0.4-0.5 ml) in groups of male or female mice of the same strain (8/group). In 1 group of these mice (males), spleen homogenate from 1/3 adjuvant-treated females induced a peritoneal, poorly differentiated large-cell sarcoma within 4 wk. This sarcoma was transplantable; after 13 passages it showed a definite tendency to transformation into a peritoneal plasmacytoma. Parallel to the change in the histological picture was a change in the serum proteins. Sera of donor and recipient mice bearing the first 2 transplant generations was normal; in the third passage a paraprotein appeared in the β-globulin region.

69-316 STUDIES ON THE CARCINOGENIC AND HEPATOTOXIC EFFECT OF FUSEL OIL. (Ger.) Gibel, W. (German Acad. Sci., Berlin), G. P. Wildner and K. Lohs. Arch. Geschwulstforsch. 32(1,2):115-125, 1968.

Fusel oil (FO) from potatoes (ethanol 0.8%, amyl alcohol 75%, isobutyl alcohol 15%, n-propyl alcohol 3-4%, fatty acids including esters 0.5%) was admin. to 3-mo.-old Wistar rats (3 doses/wk; 0.5 ml p.o. or 0.25 ml 3 s.c.) and by droplets (alone or + croton oil; 3 doses/wk., no other details) to mice. Mortality was very high; the av. survival time in rats was reduced from 23 mo. to 193 days after s.c. admin. and 183 after p.o. admin. of FO. All FO-treated mice died within 30 days. After s.c. admin. (40 rats), FO induced 3 ulcerations and erosions, 5 papillomas and 1 carcinoma of the forestomach and esophagus; 9/40 showed fatty degeneration of the liver and 5 showed severe liver parenchymal damage. After p.o. admin. (40 rats), FO induced 5 ulcerations and erosions and 10 papillomas of the forestomach and esophagus; 10/40 showed fatty degeneration of the liver and 2 showed severe liver parenchymal damage. The first pathological changes in the g.i. tract were seen after 4 wk. and papillomas after 8 wk.; the single carcinoma of the forestomach appeared 36 wk. after s.c. admin. was begun (total 58.5 ml). Severe degenerative liver damage was observed after 6 mo.

69-317 STUDIES ON NUCLEOHISTONES. IV. "HETEROCHROMATIZATION" IN THE RAT LIVER DURING CARCINOGENESIS. (Ger.) Harbers, E. (U. Göttingen, Germany), B. Lederer, W. Sandritter and U. Spaar. Virchows Arch. Abt. B Zellpath. 1(2):98-106, 1968.

Nuclear fractions of rat liver containing euchromatin and heterochromatin were obtained and analyzed for DNA content after 40 days of continuous admin. of diethylnitrosamine (3 mg/kg/day) or N-nitrosomorpholine (10 mg/kg/day) in the drinking water. At that time, the heterochromatin content increased from about 20% (controls) to 40-50%. This was seen before the appearance of hepatomas, which require a continued treatment for at least 180 days; at 40 days with these dosages, the liver barely shows some cirrhotic changes. The increase of heterochromatin was accompanied by a corresponding decrease in euchromatin. Morphological studies corroborated an augmented heterochromatization. The DNA content/nucleus remained unchanged during this phase of carcinogenesis.

69-318 LOCAL AND RESORPTIVE EFFECTS OF 7,12-DIMETHYLBENZ α ANTHRACENE IN CC57BR MICE.. (Rus.) Dzhioev, F. K. (Petrov Res. Inst. Oncol., Leningrad, U.S.S.R.) and D. A. Asadov. Vop. Onkol. 14(7):53-57, 1968.

In male CC57BR mice admin. 1 topical application of 7,12-dimethylbenz α anthracene (DMBA; 0.5 mg/mouse, or 0.1 ml of 0.5% soln.), the first skin tumors developed 26 days later but 10/36 died before that time. In the survivors the skin tumor incidence 12/26 (46%); in the 1-yr. survivors the tumor incidence was lung adenoma 19/21 (90%); forestomach papilloma 14/21 (62%); cavernous hemangioma of the intestinal wall 15/21 (71%); hemangioendothelioma and cavernous hemangioma of the liver 7/21 (33%) and leukemia 6/21 (23%). Of 15 mice not treated by DMBA until the end of the experiment, 13 survived without tumors of the skin or internal organs. The absence of tumors in 5 control mice placed together with treated mice eliminated the assumption that the g.i. neoplasms developed after skin licking at the site of DMBA application or by ingestion of food contaminated by DMBA. It is most possible that tumor development in the internal organs of treated mice depended on DMBA absorption through the skin. The time of development of the tumors of the internal organs could not be determined, but none of the mice which died after 7-9 mo. of the experiment showed tumors of the internal organs.

69-319 DISTRIBUTION OF BENZIDINE IN THE ORGANS AND EFFECTS ON THE PERIPHERAL BLOOD IN RATS. (Rus.) Soloimskaia, E. A. (Petrov Res. Inst. Oncol., Leningrad, U.S.S.R.) Vop. Onkol. 14(7):51-53, 1968.

In rats treated i.p. with benzidine (B; 100 mg/kg) and examined 1-120 hr. later, the WBC increased and the RBC decreased, platelets decreased in the first 7 hr., then returned to initial levels. A shift to left of the WBC formula was seen, with an increase in neutrophils and appearance of immature forms. Blood catalase activity slightly increased in the first 2 hr., then decreased to values 2.4-fold below the initial level; peroxidase activity remained unchanged during the first 7 hr. then decreased to 1.8-fold below initial values. Blood content of free and bound B reached max. levels 2 and 3 hr. after admin., resp.; after 8 hr. only traces of free or bound B could be detected. B levels were high in liver and kidneys and low in spleen, heart and lungs. Therefore, it could be assumed that the frequency of liver neoplasms is associated with the higher B conc. in the liver; many occupational bladder tumors in aniline dye workers could be explained by the high conc. of B in the kidneys (which then reaches the bladder in the urine).

69-320 ANTICARCINOGENIC EFFECT OF MAGNESIUM. (Rus.) Bazikian, K. A. (Petrov Res. Inst. Oncol., Leningrad, U.S.S.R.) and A. A. Akimov. Vop. Onkol. 14(7):57-61, 1968.

Magnesium chloride ($MgCl_2$; 60 mg/kg/day p.o.) reduced the toxic effect of 9,10-dimethyl-1,2-benzanthracene (DMBA; 50 mg/kg every 2 days for 1 mo., topically) and of 1,2,5,6-dibenzanthracene (DBA; 3 mg x 1 s.c.) as well as the yield of skin papilloma and s.c. sarcoma in mature male CC57BR mice. In mice treated with $MgCl_2$ + DMBA for 30 days, 24/30 survived for 200 days and 16 showed tumors (66%; av. 0.8/mouse), compared to 22/29 and 18/22 (82%; av. 1.1/mouse). In mice treated with $MgCl_2$ alone for 7 days (as prophylaxis) followed by 30 days with $MgCl_2$ + DMBA, 24/30 survived 200 days and 12 showed tumors (av. 0.63/mouse); in mice treated with $MgCl_2$ alone for 7 days, followed by DMBA for 53 days, 27/31 survived 200 days and 11 showed tumors (41%; av. 0.55/mouse). In mice treated for 48 days with $MgCl_2$, from day 8 after the initiation of treatment of DMBA (i.e., until the appearance of the first papillomas) 17/29 survived 200 days and 11 showed tumors (65%; av. 0.82/mouse), compared to 19/29 and 14/19 (74%; av. 0.9/mouse), resp., in controls. In mice admin. DBA and $MgCl_2$ (for 30 days), 15/19 survived 200 days and 10/15 (66%) developed s.c. sarcomas; in mice treated with $MgCl_2$ alone (200 days), 19/21 survived 200 days and 7 (37%) developed sarcomas compared to 18/30 and 15/18 (83%), resp., in controls.

69-321 CARCINOGENICITY OF 1-METHYL-1-NITROSOUREA IN NEWBORN MICE AND RATS. (E.)

Kelly, M. G. (NCI, Bethesda, Md.), R. W. O'Gara, S. T. Yancey and C. Botkin. *J. Nat. Cancer Inst.* 41(3):619-626, 1968.

No gross or histologic evidence of brain tumors were observed in newborn Sprague-Dawley rats or General Purpose (GP) and (BALB/c x DBA/2)F$_1$ (CDF$_1$) mice admin. 1-methyl-1-nitrosourea (MNU). The acute LD$_{50}$ of a single intracerebral (i.c.) inj. of MNU was about 0.43 mg in rats and 0.15 mg in mice (rat/mouse ratio 1-1.4 or 1-0.7 with doses calculated in mg/kg and mg/m^2, resp.). No strain differences in MNU toxicity were seen in the mice. The i.c. and s.c. toxicity was about the same in the mouse strains. Pathological changes induced after 14-32 wk. by MNU (0.05-1.6 mg x 1 i.c.) in newborn rats included nephrosis (1/10 admin. 0.1 mg), mammary carcinoma (1/7 admin. 0.4 mg), fibrosarcoma of the kidney (2/6 admin. 0.2 mg, 1/7 admin. 0.4 mg) and osteoid lesions of the kidney (possibly pre-fibrosarcoma) in 1/6 admin. 0.2 mg and 1/7 admin. 0.4 mg. No pathological changes were seen in the other 34/50 after 24-37 wk. In GP mice, MNU (0.05-0.1 mg i.c. or s.c.) induced leukemia in 37-80%; the av. and max. latent periods were 14 and 23 wk., resp. Multiple pulmonary tumors were induced by MNU by both routes of admin.; the incidence (67-100%) and av. nodule count (4-9) were apparently dose-dependent. CDF$_1$ mice were somewhat less sensitive than GP mice to MNU leukemogenesis (0.1-0.5 mg i.c. or s.c.); 8-80% developed a transplantable leukemia with an av. latent period of 19.4 wk. CDF$_1$ mice were somewhat more susceptible than GP mice to pulmonary tumor induction; nearly 100% of the CDF$_1$ mice had pulmonary tumors at autopsy (av. 6-18 nodules/mouse). MNU did not induce s.c. tumors in the mice.

69-322 PULMONARY ADENOMA OF STRAIN A MICE: AN ELECTRON MICROSCOPIC STUDY. (E.) Brooks, R. E. (U. Oregon Med. Sch., Portland). *J. Nat. Cancer Inst.* 41(3):719-742, 1968.

No marked morphological differences were found between spontaneous lung adenomas and tumors induced by urethan (U) in young or old A/He mice or induced in young mice admin. U *in utero* and/or through their mother's milk. Most tumor cells appeared very similar to type B alveolar cells. The mitochondria, multivesicular bodies and granular endoplasmic reticulum were generally similar to normal A and B cells. The Golgi apparatus in many tumor cells appeared more fully developed. Enlarged nucleoli or large chromatin aggregates were seen in some adenoma nuclei, but the nuclei generally did not differ markedly from type B cells. Multivesicular bodies were more numerous in adenoma cells than in type B cells. Some tumor cells contained masses of glycogen, which was absent in normal type B cells. Tumor cells had a crystalloid component not identified in type B cells. Treatment with U had no effect on type B alveolar cell ultrastructure. It is concluded that mouse lung adenomas are derived from the type B alveolar cell.

69-323 SYNTHESIS OF 3,4-BENZPYRENE AND OTHER POLYCYCLIC AROMATIC HYDROCARBONS IN PLANTS. (Ger.) Borneff, J. (U. Mainz, Germany), F. Selenka, H. Kunte and A. Maximos. *Arch. Hyg. Bakt.* 152(3):279-282, 1968.

In fresh-water algae grown for up to 3 wk. in medium containing ^{14}C-acetate (up to 200 µC/100 ml was tolerated without damage) as the sole source of carbon, polycyclic aromatic hydrocarbons (PAH) were formed in large quantities. The treated/unlabeled control ratio of PAH formation (in cpm) was: fluoranthene 1973/126 (15.7:1.0); 1,2-benzanthracene 408/30 (13.6:1.0); 3,4-benzfluoranthrene 133/12 (11.1:1.0); 3,4-benzpyrene 118/11 (10.7:1.0); 1,2-benzperylene 934/57 (16.4:1.0); 11,12-benzfluoranthrene 158/22 (7.2:1.0); and indenopyrene 252/19 (13.3:1.0). Previous studies had shown that PAH synthesis by algae was independent of photosynthesis.

69-324 SYNTHESIS OF POLYCYCLIC AROMATIC COMPOUNDS BY BACTERIA. (Ger.) Knorr, M. (U. Erlangen-Nuremberg, Germany) and D. Schenk. *Arch. Hyg. Bakt.* 152(3):282-284, 1968.

The synthesis of 3,4-benzo(a)pyrene (BP) and other carcinogenic polycyclic aromatic hydrocarbons (PAH; including fluoranthrene, 3,4- or 10,11-benzfluoranthrene and 1,2-benzanthracene) was studied in several strains of human saprophytic or pathogenic bacteria after cultivation on PAH-free (benzene-extracted) agar or glycerin-fructose-agar medium. In 10 studies of 8 saprophytic mycobacteria, BP synthesis was 2.0-4.8 µg/100 g bacteria (3.4 µg/100 g or over in 4/10 tests). BP synthesis was about the same in each medium. BP synthesis in several species (in µg/100 g bacteria) was: *Mycobacterium smegmatis* 2.6, 6.0 µg/100 g; *Proteus vulgaris*, 5.6 µg/100 g; *E. coli* strains 92 and 91, 5.0 and 4.6 µg/100 g, resp.; *Pseudomonas fluorescens*, 3.0 µg/100 g; and *Serratia marcescens*, 2.0 µg/100 g. Other carcinogenic PAH were also synthesized (no other details). The relationship between *Mycobacterium smegmatis* and cancer of the cervix and penis is briefly discussed.

69-325 CARCINOGENIC SUBSTANCES IN WATER AND SOIL. XXIII. SEPARATION OF POLYCYCLIC AROMATIC HYDROCARBONS FROM DRINKING WATER SUPPLIES USING ClO$_2$: ISOLATION AND IDENTIFICATION OF 3,4-BENZPYRENE REACTION PRODUCTS. (Ger.) Reichert, J. K. (U. Mainz, Germany). *Arch. Hyg. Bakt.* 152(3):265-276, 1968.

An aqueous soln. of 3,4-benzpyrene (3,4-BP; 1-10 µg/1000 ml distilled water) was reacted with chlorine peroxide (ClO$_2$; 1.0 mg) for 1-4 hr.; the organic phase was then extracted by benzene and separated by paper and thin-layer chromatography, and the reaction products were determined by UV, infrared and mass spectrophotometry. Eight derivatives were identified. About 90% consisted of the 1,5-, 5,8- and 5,10-quinones of 3,4-BP, which are non-carcinogens and may be tumor inhibitors. Four products showed violet fluorescence; 2 were identified as 5-chloro- and 5,8,10-trichloro-3,4-BP and the other 2 were probably also chlorinated derivatives. Preliminary animal experiments with the 2 identified chlorinated derivatives demonstrated less carcinogenic activity than 3,4-BP itself (no other details). It is concluded that addition of ClO_2 to the drinking water can inactivate 3,4-BP at these levels.

69-326 CARCINOGENIC SUBSTANCES IN WATER AND SOIL. XXIV. SEPARATION OF POLYCYCLIC AROMATIC HYDROCARBONS FROM DRINKING WATER SUPPLIES USING ClO_2: IDENTIFICATION OF HITHERTO UNKNOWN BENZPYRENE-ClO_2 REACTION PRODUCTS. (Ger.) Reichert, J. K. (U. Mainz, Germany). Arch. Hyg. Bakt. 152(3):277-279, 1968.

Reaction of 3,4-benzpyrene (1-10 μg/1000 ml water) + chlorine peroxide (ClO_2; 1.0 mg) under conditions resembling those obtained in a water works, yielded several derivatives, including 4 violet-fluorescing compounds (see the preceding abstract). Mass spectroscopy of the 2 unknown compounds identified them as isomeric dichloro derivatives, but the sites of chlorination could not be determined.

69-327 STUDIES OF THE DANGER OF SOOT AND DUSTY AIR, WITH PARTICULAR REFERENCE TO ITS CARCINOGENIC ACTION. IX. SEPARATION OF 3,4-BENZPYRENE AFTER INHALATION AND INTRATRACHEAL INFUSION OF BENZPYRENE-CONTAINING DUST IN THE LUNGS OF LIVING RATS. (Ger.) Kutscher, W. (U. Heidelberg, Germany), R. Tomingas and H. P. Weisfeld. Arch. Hyg. Bakt. 152(3):285-288, 1968.

In anesthetized rats treated with soot containing 3,4-benzo(a)pyrene (BP) by inhalation (5000 μg BP/1 g soot; 2 doses/day; total 42-344 min. of inhalation in 5-25 doses), only 1/18 showed BP in the lung tissue up to 48 hr. after the end of treatment. Another experiment in rats admin. BP-containing soot for 15 min./day (av. 1621 μg BP/1 g soot; total 60-120 min. of inhalation), BP separated from the soot after 4 hr. and penetrated the lung tissue. The soot particle size in both groups was the same (27.8 mμm diameter). In rats admin. BP-containing soot by intratracheal inj. (av. 108.7 μg BP/0.2 ml/dose) in tricaprylin, BP was seen in the lung tissue of 9/9 rats sacrificed 2-14 hr. later and in 1/3 after 14.5 hr. The BP content of the lung tissue was 24.0 μg (1 rat) after 8 hr. and 6.5-17.0 μg after 14 hr. (2 rats). No BP was seen in the lung tissue after 15-167 hr., although BP remained in the soot particles at all times tested (31.0 and 25.5 μg in 2 rats sacrificed after 144 or 167 hr., resp.). In 3 rats admin. a similar dose of BP, the lungs showed BP-containing soot in 2/3 after 4 mo.; in 1/3, examined after 14 mo., no BP was seen in the dust particles. In rats admin. a larger dose of BP (272 μg/0.6 ml tricaprylin) by intratracheal admin., BP levels in the lung tissue reached 19.8% of the admin. dose after 24 hr. but disappeared after 27 hr.

69-328 STUDIES OF THE DANGER OF SOOT AND DUSTY AIR, WITH PARTICULAR REFERENCE TO ITS CARCINOGENIC ACTION. X. DUST MEASUREMENT WITH THE TM-II TEST APPARATUS IN A HEAVY-TRAFFIC STREET INTERSECTION IN HEIDELBERG. (Ger.) Kutscher, W. (U. Heidelberg, Germany) and R. Tomingas. Arch. Hyg. Bakt. 152(3):260-264, 1968.

During July, 1967 (which was very warm and free of rain), 10 measurements of air soot content were made at 2 busy street intersections (close together) in Heidelberg; a previous traffic count showed 16,241 vehicles within 12 hr. of daylight. The range of air soot conc. was 350-1583 μg/m^3 air (both extremes were seen in a 2-day period); soot levels over 1.0 mg/m^3 air (regarded as very high) were seen on 5 days, not consecutively. The conc. of 3,4-benzo(a)pyrene (BP) was measured in 3 cumulative air samples. Samples collected on July 6, 7 and 11, with soot levels of 1.583, 0.858 and 0.875 mg/m^3 air, resp., had a total BP conc. of 97.2 μg/m^3. Samples collected on July 21, 25 and 27, with soot levels of 0.866, 0.916 and 1.25 mg/m^3 air, resp., had a total BP conc. of 37.0 μg/m^3 air. Samples collected on July 13, 18 and 28, with high soot levels (1.05, 1.083 and 1.33 mg/m^3 air, resp.) showed a total BP conc. of 42.5 μg/m^3 air. Motor vehicle exhaust was the probable source of these very high levels of soot pollution, since other sources of pollution were excluded by placing the collection apparatus high above street level (1.8 m). The soot particles collected by the apparatus were of a size that could easily penetrate into the deep portions of the respiratory tract.

69-329 HYDROCARBONS IN THE HUMAN ENVIRONMENT. VI. THE CONTENT OF POLYCYCLIC HYDROCARBONS IN CRUDE VEGETABLE OILS. (Ger.) Grimmer, G. (German Res. Assn., Bad Godesberg, Germany) and A. Hildebrandt. Arch. Hyg. Bakt. 152(3):255-259, 1968.

The conc. of 13 polycyclic aromatic hydrocarbons was determined in 64 crude samples of 9 vegetable oils. The highest levels were seen in coconut oil from smoke-dried copra; av. contents of phenanthrene, anthracene, pyrene, fluorene, chrysene and 3,4-benzo(a)pyrene (BP) were 1180, 402, 393, 272, 129 and 43.7 μg/kg, resp. Av. BP levels in sunflower and palm kernel oil were significantly lower (10.6 and 4.1 μg/kg); carrot, palm, peanut, soybean, cottonseed and linseed oils had very low levels of BP (1.4-2.8 μg/kg) and other carcinogens.

69-330 CONTENTS OF POLYCYCLIC AROMATIC HYDROCARBONS IN EDIBLE OILS AND THEIR REMOVAL.

(Ger.) Biernoth, G. (Unilever Res. Lab., Hamburg, Germany) and H. E. Rost. Arch. Hyg. Bakt. 152(3): 283-250, 1968.

The contents of polycyclic aromatic hydrocarbons (PAH) in 5 samples each of commercial peanut and sunflower oil were 50-225 and 80-655 μg/kg, resp.; only 1/5 samples of each oil contained less than 120 μg/kg. Phenanthrene and anthracene predominated in sunflower oil, pyrene and fluoranthrene in peanut oil. Soybean oil had a low PAH content (13, 15 and 180 μg/kg in 3 samples). Coconut oil had the highest PAH content (up to 3000 μg/kg in some samples), predominantly phenanthrene, anthracene, pyrene, fluoranthrene, 1,2-benzanthracene and chrysene. The highest PAH content was seen in crude oil from smoke-dried copra. Conventional refining processes were of varied efficiency in removing PAH. Bleaching earth had little effect; deodorization removed the tri- and tetracyclic PAH without affecting the pentacyclic and higher compounds (which could be removed by activated charcoal). Commercial activated charcoals had different capacities to adsorb PAH. PAH adsorption was not affected by adding bleaching earth to the charcoal. It is concluded that a combination of activated charcoal treatment and deodorization is the best method for removing PAH from edible oils and fats.

69-331 CARCINOGENIC SUBSTANCES IN EDIBLE FATS AND OILS. V. STUDIES OF SAUSAGE AFTER DIFFERENT METHODS OF COOKING. (Ger.) Fábián, B. (U. Mainz, Germany). Arch. Hyg. Bakt. 152(3):251-254, 1968.

The corrected conc. of total aromatic hydrocarbons (AH) and carcinogenic AH in raw "Coburger" or "Thüringer" sausage were 11.8 and 1.5 μg/kg, resp. After pan frying, charcoal grilling, grilling over pine cones and infrared grilling, the total AH contents were 11.0, 115.0, 196.0 and 4.2 μg/kg, resp.; total contents of carcinogenic AH were 7.4, 54.8, 88.5 and 0.17 μg/kg, resp. The levels of 3,4- and 9,10-benzfluoranthrene, idenopyrene and 3,4-benzpyrene increased markedly after grilling over charcoal or pine cones; these preparations were also the only ones containing 1,2-benzanthracene. It is concluded that the carcinogenic AH are formed pyrolytically and enter the sausages with the smoke.

69-332 IRON-DEXTRAN INDUCTION OF DISTANT-TUMOURS IN MICE. (E.) Langvad, E. (The Fibiger Lab., Kgs. Lyngby, Denmark). Int. J. Cancer 3(4):415-423, 1968.

A single i.v. inj. of Intrafer (iron-carbohydrate complex; 50-500 mg Fe^{3+}/kg) to ST/a mice caused death but no tumors in 43.3% of 60 animals within 20 wk.; 15 (30%) of the 20-wk. survivors died with tumors (2 local sarcomas), compared to 6/38 controls (not a significant difference). Imferon (iron-dextran; 12.5-25 mg/wk. s.c.) caused local sarcomas in 11/20 Wistar rats, but did not increase the tumor incidence in 4 strains of mice (5-10 mg/wk. s.c.). The leukemia incidence in AKR/a mice was not influenced by Imferon treatment; the mammary carcinoma incidence in C3H mice was lower in treated than untreated animals (1/28 and 4/21, resp.). A single s.c. inj. of Imferon (25-2500 mg Fe^{3+}/kg) admin. to ST/a mice caused distant tumor development in 7.4% of males and 44.5% of females (5.1% and 2.17%, resp., in controls). Of the females admin. 25-500 mg/kg (as Fe^{+3}), 29/99 (29.3%) developed lymphoreticular neoplasms (mean latency of 75.3 wk.) and 15/99 (15.1%) developed non-lymphoreticular neoplasms (95.4 wk. mean latency). Corresponding values for control females were 9/60 (15%) and 4/60 (6.7%), with mean latency periods of 75.8 and 76.5 wk., resp. Imferon therefore influenced the incidence but not the latency period of lymphoreticular neoplasms in female mice, while the non-lymphoreticular neoplasms in treated females developed after a longer latency period than in controls. Iron deposits in the perivascular RES structures were found in animals shortly after treatment with 500 mg Fe^{3+}/kg, but after 20 wk. these deposits were rare. Later lymphocytic infiltrates were seen in the perivascular structures, which gradually changed into reticulum cell infiltrates and reticulum cell sarcoma. At small doses no iron deposits were found, but histological events were the same. After i.v. inj. of iron-carbohydrate complex, iron deposits were observed at similar locations but the characteristic cellular reactions were absent.

69-333 IS MITOCHONDRIAL MUTATION THE CAUSE OF MALIGNANT TRANSFORMATION? (Ger.) Graffi, A. (German Acad. Sciences, Berlin). Zbl. Gynaek. 90(28):945-958, 1968.

Isolated mitochondria from rat embryos (<1 g), placenta and liver tissue maintained their structural integrity in vitro for over 2 wk., but protein synthesis (tested by leucine incorporation) decreased with time. Mitochondria from young embryo tissue showed more protein synthesis than non-growing normal tissue and tumor tissue from mice, rats and hamsters. Mitochondrial protein synthesis (normal liver, kidney, placenta and tumor tissue) was stimulated by addition of other amino acids, α-ketoglutarate or other substrates of the citric acid cycle, but the values for tumor mitochondria were lower than those from rapidly growing normal tissues. The effect of nitrosomethylurea (NMU) and several azo dyes on protein synthesis of mitochondria in vitro was then tested. NMU (0.1-0.3%) caused conc.-dependent inhibition of leucine incorporation in rat embryo and (to a lesser degree) liver and kidney mitochondria. Carcinogenic azo dyes and 2-acetylaminofluorene had similar effects after 20-60 min. of treatment. This inhibition of leucine incorporation paralleled the carcinogenic effect. NMU also damaged mitochondrial ultrastructure in paramecia. Lipid synthesis in mitochondria from tumor tissue (hepatoma and hepatocellular carcinoma) was much lower than in mitochondria from normal tissue (liver). Mitochondrial DNA contents varied widely. The highest values were found in tumor tissue (always higher than in normal tissue), nedium values were found in growing normal tissue (embryo tissue and placenta) and lowest in nongrowing tissue (liver and kidney). Mitochondrial DNA, after 2 hr. of treatment with ^{14}C-NMU, was ound to the NMU methyl group; mitochondrial DNA inding was greater than that of nuclear NA. It is concluded that, at least in certain ases, primary mitochondrial mutation should be onsidered as the cause of malignant transformaion.

9-334 QUESTION OF THE ROLE OF HORMONAL DISTURBANCES IN THE ETIOLOGY OF SOME NEOPLASMS.
Rus.) Salazkin, M. A. (Sci. Res. Inst. Neurosurg., oscow). Vop. Neirokhir. 32(3):11-15, 1968.

n 500 pts. (251 males, 249 females, age 11-65 yr.) ith pituitary tumors (PT), the morbidity was highst at age 26-35 yr., decreased somewhat after age 5, remained stable to age 50, then markedly dereased. The author suggests that if hormonal imalance is etiologically important in the developent of PT, it is also possible that a disturbance f hormonal balance caused by a PT could be reponsible for the development of other tumors, especially in the endocrine glands which are actively stimulated by pituitary hormones. Ten pts. (2 men, 8 women; age 32-56 yr.) with PT associated with other tumors are presented: 5/10 (2 men, 3 women) with thyroid tumors (4/5 showed marked acromegalic changes, 1 woman underwent removal of a chromophobic PT), 3/10 with breast cancer (2/3 with chromophobic adenoma, 1/3 with anaplastic adenoma), 2/10 with brain tumors (cranospinal arachnoidendothelioma or acoustic neurinoma) and 1/10 with acromegaly and uterine fibroma. The author's hypothesis is that a deficit of sex hormones affects pituitary function by increasing its secretion of gonadotropin (G), which stimulates gonadal function; this increase and prolonged excretory activity of pituitary G-producing cells disturbs intracellular metabolism and increases DNA synthesis. Stimulation of DNA synthesis in a non-growing organ could then lead to tumor development. A disturbance of pituitary function also disturbs hormonal activity of other endocrine glands, changing intracellular metabolism in these organs or their target tissues and creating a condition for malignant growth.

69-335 EXCITED SINGLET ABSORPTION IN 1,2-BENZANTHRACENE BY THE USE OF NANOSECOND LASER PHOTOLYSIS AND SPECTROSCOPY. (E.) Novak, J. R. (TRW Systems, Redondo Beach, Calif.) and M. W. Windsor. Science 161(3848):1342-1343, 1968.

See also abstract nos.: 217,223,224,225,226,227,231,236,242,422,423

VIRAL CARCINOGENESIS

Most abstracts in this section are supplied by the National Cancer Institute. Names of the abstractors are presented for each abstract. Unsigned abstracts have been prepared by Medical Literature, Inc.

69-336 ATTEMPTED USE OF INTERFERENCE PHENOMENA FOR THE DETECTION OF PRESUMED HUMAN LEUKEMIA VIRUSES. (Rus.) Merekalova, Z. I. (Inst. Exper. Clin. Oncology, Acad. Med. Sci., Moscow), N. P. Mazurenko and N. V. Streliukhina. Probl. Gemat. 13(8):13-15, 1968.

In human fetal kidney cells and skin-muscle tissues in vitro, addition of "infected" material from the WBC and bone marrow of 4 pts. with acute hemocytoblastic leukemia and 19 pts. with other forms of leukemia (bone marrow cells were taken before and after treatment with antileukemic agents and irradiation) caused no morphologic changes, indicating an absence of mycoplasma in the culture. Further attempts to detect possible human leukemia viruses in human embryonic tissue cultures by interference with Sendai virus, Newcastle disease virus and smallpox vaccine also failed under these conditions. (MLI)

69-337 BIOLOGIC ACTIVITY OF AFRICAN LYMPHOMA EXTRACTS. (E.) Bergamini, F., P. Frost and G. Dalldorf. Proc. Soc. Exp. Biol. Med. 127(4):1141-1146, 1968.

Postnasal and ovarian Burkitt lymphomas are relatively common; the former are limited to the higher, colder areas and the lymphomas to the lowlands. Thus the distribution of the herpes-like virus does not conform to the geographic distribution of the lymphomas. It is therefore difficult to relate the herpes-like virus with the original theory of a virus disease limited to areas where tropical mosquitoes are common and possibly mosquito-transmitted. Extracts of Burkitt lymphomas frequently induced morphological alterations in cultured primary human amnion cells, associated with resistance to infection by several viruses. (NCI)

69-338 CHARACTER OF A HERPES-LIKE VIRUS RECOVERED FROM BURKITT LYMPHOMA CELLS (P3-J) AND PROPAGATED IN DOGY THYMUS CELLS. I. AN ELECTRON MICROSCOPE STUDY. (E.) Hinz, R. W. (Michigan State U., East Lansing), C. A. Bowles, G. H. Connor, J. R. Mitchell and G. R. Anderson. J. Nat. Cancer Inst. 40(3):477-489, 1968.

A herpes-like virus recovered from the P3-J line of Burkitt lymphoma cells superinfected with Moloney mouse sarcoma virus was isolated in newborn dog thymus cells in culture. Electron microscopic studies of the developmental stages of this virus at different intervals following infection of the dog thymus cells are presented. This virus followed the typical morphologic patterns associated with herpes viruses; its antigenic nature and oncogenic capacity are being investigated. (E. Y. Lasfargues)

69-339 INFECTIOUS MONONUCLEOSIS: COMPLEMENT-FIXING ANTIBODIES TO HERPES-LIKE VIRUS ASSOCIATED WITH BURKITT LYMPHOMA. (E.) Gerber, P., D. Hamre, R. A. Moy and E. N. Rosenblum. Science 161(3837):173-175, 1968.

Complement-fixing antibodies to a herpes-like virus derived from a Burkitt tumor cell line developed in 21/21 pts. with infectious mononucleosis. These antibodies were absent in all serums before the pts. became ill, appeared during the early phases of illness and persisted for long periods of time. These antibodies are distinct from heterophile antibodies. None of the pts. developed immune responses to herpes simplex, cytomegalo or reoviruses during the illness. The data suggest that the development of complement-fixing antibodies to this herpes-like virus in these pts. may be linked to infectious mononucleosis. (L. Scott)

69-340 INFECTIOUS MONONUCLEOSIS: DETECTION OF HERPES-LIKE VIRUS AND RETICULAR AGGREGATES OF SMALL CYTOPLASMIC PARTICLES IN CONTINUOUS CELL LINES DERIVED FROM PERIPHERAL BLOOD. (E.) Moses, H. L., P. R. Glade, J. A. Kasel, A. S. Rosenthal, Y. Hirshaut and L. N. Chassin. Proc. Nat. Acad. Sci. USA 60(2):489-496, 1968.

Burkitt's tumor-associated, herpes-like virus was identified in 4/14 cell lines from peripheral blood cultures of 9 pts. with heterophile-positive infectious mononucleosis. All cultures contained reticular arrays of small particles associated with rough endoplasmic reticulum. Relationship of particles to infectious viral particles are not established, but they appear to be virus-associated. (NCI)

69-341 INHIBITORY EFFECTS OF BURKITT LYMPHOMA CULTURE MATERIAL ON HERPES SIMPLEX VIRUS. (E.) Minowada, J. and S. Shigeta. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 37-38 (Abst. #75) 1968.

Cell-free culture media from Burkitt lymphoma cultures, with or without herpes-type virus, inhibited herpes simplex virus. This inhibition was caused by the presence of an interferon as well as a herpes virus antibody believed to be of the IgM class. (NCI)

69-342 EFFECT OF A HERPES GROUP VIRUS (EBV) ON GROWTH OF PERIPHERAL LEUKOCYTE CULTURES. (E.) Henle, W., G. Henle and V. Diehl. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 64 (Abst. #S9) 1968.

The Epstein-Barr virus (EBV) from cells derived from Burkitt lymphoma (or a close relative) is also associated with infectious mononucleosis. EBV stimulated the growth of peripheral WBC cultures and may be essential for the establishment of cell lines derived from these cultures. (NCI)

69-343 STUDIES OF HUMAN HEMATOPOIETIC CELLS. (E.) Moore, G. E. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 64-65 (Abst. #S10) 1968.

Cell lines have been established from the peripheral blood of hundreds of pts. with various leukemias, lymphomas and other hematopoietic disorders. A herpes-like virus was found in cells cultured from Burkitt lymphoma and from hematopoietic cells of normal persons and from pts. with other malignancies. (NCI)

69-344 C-GROUP CHROMOSOME MARKER IN LONG TERM LEUKOCYTE SUSPENSION CULTURES. (E.) Kohn, G., V. Diehl, W. J. Mellman, W. Henle and G. Henle. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 61 (Abst. #138) 1968.

The presence of a subterminal secondary constriction of the long arms of the #10 chromosome has been reported in several cell lines established from Burkitt lymphoma tissues. A correlation was found between the presence of this chromosomal marker and the presence of herpes-like virus particles associated with the tumor. This marker has also been found in peripheral blood leukocytes obtained from normal and acute infectious mononucleosis patients. (NCI)

69-345 OBSERVATIONS ON THE TRANSFORMATION OF HUMAN AMNION CELL CULTURES BY SIMIAN VIRUS 40. (E.) Chang, R. S. (Harvard Sch. Pub. Health, Boston, Mass.), and T. J. Sinskey. J. Nat. Cancer Inst. 40(3):505-512, 1968.

Human amnion cells were readily transformed by SV40 and the transformed foci were easily recognized. X-irradiation blocked cell transformation but not virus synthesis and hydrocortisone delayed the appearance of transformed foci. Older cultures seemed more susceptible than younger ones; overcrowding also delays the appearance of the transformed foci. (E. Y. Lasfargues)

69-346 CORRELATION BETWEEN POLIOVIRUS RESISTANCE AND SV40 TRANSFORMATION OF HUMAN AMNION CELLS. (E.) Hahn, E. C. and J. Fogh. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 14 (Abst. #10) 1968.

Resistance of SV40-transformed human amnion cells to poliovirus infection was associated with the cellular alterations of viral transformation and not the effect of viral interference by SV40, which is continuously produced in the transformed cell cultures. Selective destruction of untransformed cells was observed after poliovirus infection. (NCI)

69-347 GROWTH OF THE SV40-ADENO 7 HYBRID VIRUS IN HUMAN DIPLOID CELLS. (E.) Kutinova, L. Int. J. Cancer 3(3):344-350, 1968.

Replication of SV40-Adeno 7 hybrid virus (SP-2) was studied in a diploid cell strain derived from human embryo lung tissue (LEP). Adeno 7 and PARA viruses both multiplied in dually infected LEP cell cultures. The growth curve of the adeno-7 component in LEP cells was unaffected by the presence or absence of PARA, while evidence suggests that the growth of PARA in LEP cells is dependent on the presence of helper adenovirus. (R. H. Bassin)

69-348 VIRUS-LIKE PARTICLES WITHIN CULTURED CELLS FROM NEOPLASMS ORIGINALLY INDUCED IN VIVO BY SV30. (E.) Merkow, L., M. Slifkin, M. Pardo and M. Sanchez. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 13-14 (Abst. #8) 1968.

Simian adenovirus 30 was oncogenic for newborn hamsters. Virus-like particles were demonstrated by electron microscopic examination of tumor cells. Virus-like particles were also demonstrated in these cells in vitro. (NCI)

69-349 NUCLEIC ACID METHYLASE ACTIVITY IN HAMSTERS BEARING TUMORS INDUCED BY ADENOVIRUS-12. (E.) McFarlane, E. S. and G. J. Shaw. Canad. J. Microbiol. 14(5):499-502, 1968.

Cell-free extracts of adenovirus-12-induced tumor cells showed higher transfer RNA (t-RNA) methylase activity than extracts from liver, lung, kidney, spleen, or skin and muscle of normal or tumor-bearing hamsters. The t-RNA methylase activities in extracts of hamster embryos were in the range found for normal adult tissue extracts. No difference in the methylation of DNA or ribosomal RNA was found between extracts of normal tissue and tumor. (NCI)

69-350 IN VITRO ANTIBODY RESPONSES OF LYMPHOID TISSUES OF HAMSTERS BEARING ADENOVIRUS TYPE 12. (E.) Reddick, R. A. and S. S. Lefkowitz. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 53 (Abst. #116) 1968.

Lymph node fragments from hamsters bearing adenovirus type 12 tumors were challenged with homotypic viral antigens in vitro. Antibody to these antigens was detected in the culture fluids by passive hemagglutination. (NCI)

69-351 INTERACTION OF ADENOVIRUS TYPE 12 DNA WITH HOST CELL CHROMOSOMES. (E.)

Zur Hausen, H. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 38-39 (Abst. #78) 1968.

Adenovirus type 12 genome induces chromosomal aberrations. Cells with these altered chromosomes cannot divide. (NCI)

69-352 SIMIAN ADENOVIRUS SA7 DNA: CHEMICAL, PHYSICAL, AND BIOLOGICAL STUDIES. (E.) Burnett, J. P. and J. A. Harrington. Proc. Nat. Acad. Sci. USA 60(3):1023-1029, 1968.

DNA of simian adenovirus SA_7 was examined. Physical and chemical data are consistent with a linear duplex structure with a molecular wt. of about 22.0×10^6, a G + C content of 60% and no evidence of circular structures. Tumor formation was observed in both newborn and weanling hamsters following inj. of SA_7 DNA, with evidence that the tumors are DNA-induced. (A. O'C. Deeney)

69-353 TEMPERATURE DEPENDENCE OF THE SYNTHESIS OF ADENOVIRUS TUMOR AND VIRAL ANTIGENS. (E.) Rhim, J. S. (NIH, Bethesda, Md.), K. Schell, H. C. Turner and R. J. Huebner. Proc. Soc. Exp. Biol. Med. 127(2):642-646, 1968.

The synthesis of adenovirus T and V antigens in infected cell cultures incub. at different temperatures was studied. At low temperature (24° C) the development of V antigens was limited, while significantly larger amounts of T antigen were produced. Raising the incub. temperature to 37° C led to a rapid increase in V antigen. Highest titers of T antigen for adenovirus types 12, 18 and 31 were obtained in Vero and RK-1 cells incub. at 30° C. The antigen produced in the cultures was unusually cross-reactive with type 7 tumor antibody. Thermal separation of the synthesis of adenovirus T and V antigens in cell cultures should provide a method for the production of adenovirus T antigens. (M. Mizell)

69-354 *IN VITRO* TRANSFORMATION OF NEWBORN-HAMSTER KIDNEY CELLS BY SIMIAN ADENOVIRUSES. (E.) Riggs, J. L. (Calif. State Dept. of Health, Berkeley, Calif.), and E. H. Lennette. J. Nat. Cancer Inst. 40(3):802-806, 1968.

Two simian adenoviruses, SA7 and SV20, induced transformation of newborn hamster kidney cells *in vitro*. Transformation was characterized by an increased growth potential of the cells, a change in morphology of the cells, the production of a new T-antigen within the transformed cells, the production of tumors in hamsters by inoc. of the cells and the appearance of complement-fixing antibodies to T-antigen in animals which developed tumors. These new T-antigens were virus-specific. (E. Y. Lasfargues)

69-355 SEROLOGICAL STUDIES OF THE T AND TUMOR ANTIGENS OF THE ONCOGENIC SIMIAN ADENOVIRUSES. (E.) Gilden, R. V., J. Kern, R. L. Heberling and R. J. Huebner. Appl. Microbiol. 16(7):1015-1018, 1968.

Tumor-specific antigens and antisera were prepared for 8 oncogenic simian adenoviruses. Complement-fixation tests revealed three distinct serological subgroups. This grouping was maintained in studies of virus-infected cells (T antigens) although high titered preparations were obtained for only the major subgroup. I. The current grouping is as follows: (I) SV1, SV11, SV25, SV33, SV34, SV38; (II) SV20, SV23; (III) SA7. Antigens from each subgroup were rapidly inactivated at 56° C; group II and III antigens were also markedly inactivated at 37° C. One of the tumors (SV1) also contained SV40 T antigen, suggesting origin from a simian adenovirus + SV40 "hybrid". (R. C. Meyer)

69-356 GROWTH AND OTHER CHARACTERISTICS OF A CELL LINE (SP-8) ESTABLISHED FROM SHOPE VIRUS-INDUCED CUTANEOUS PAPILLOMA OF DOMESTIC RABBIT. (E.) Shiratori, O., T. Osato, K. R. Utsumi and Y. Ito. Proc. Soc. Exp. Biol. Med. 128(1):12-18, 1968.

A continuous cell line (SP-8) of the Shope virus rabbit papilloma showed 2 types of cells (polygonal and columnar), both grew in primary culture and showed SPV antigen by immunofluorescence. The columnar cells grew predominately even in the first subcultivation and subsequently composed the main cellular constituent of the SP-8 cell line. Deviation of chromosome numbers from the modal number was observed. The incidence of tetraploid cells after 20 passages was higher than in the earlier passages. Although the SP-8 cells exhibited neither specific fluorescence for SPV antigen nor elevated arginase activity, the possibility of a persisting viral genome in these cells was discussed. (NCI)

69-357 STUDY OF THE VIRUS-CHROMOSOME RELATIONSHIP. VII. NEW KARYOLOGICAL STUDIES ON CELLS DERIVED FROM SHOPE PAPILLOMA. (Fr.) Prunieras, M. and C. Delescluse. Ann. Inst. Pasteur (Paris) 114(5):680-697, 1968.

Of 6 continued cultures of Shope papillomas from 4 domestic rabbits, 5 became pseudodiploid; an acrocentric chromosome was replaced by an abnormal chromosome. Of 8 control cultures of skin, 3 showed transformation in the form of a small metacentric, extra chromosome #45, probably from cell selection *in vitro*. The papilloma changes probably were due to cell selection with translocation of 2 acrocentric chromosomes. (NCI)

69-358 COMPARATIVE STUDIES OF PATHOGENESIS OF TWO STRAINS OF TRANSPLANTABLE CARCINOMA OF RABBITS, V x 2 AND V x 7. (E.) Ito, Y., I. Kimura and T. Miyake. Proc. Soc. Exp. Biol. Med. 127(4):1106-1111, 1968.

The malignancies of 2 transplantable rabbit carcinomas originating from cutaneous papillomas induced by Shope papilloma virus some 20 yr. ago were compared. The results confirmed the generally accepted impression that the Vx2 carcinoma is more malignant than the Vx7 carcinoma. Comparative studies of the growth pattern and tendency to metastasize to remote organs from the primary site of transplantation showed that the Vx2 has a more rapid growth rate and a higher frequency of formation of metastases in retroperitoneal lymph nodes, lungs and other organs than the Vx7 carcinoma. (NCI)

69-359 CELL PROLIFERATION: ENCHANCEMENT BY EXTRACTS FROM CELL SURFACES OF POLYOMA-VIRUS-TRANSFORMED CELLS. (E.) Beierle, J. W. Science 161(3843):798-799, 1968.

Dispersion of confluent monolayers of BHK21 cells with ethylenediaminetetraacetate yielded a material inhibiting cell proliferation, whereas identical extraction of polyoma virus-transformed cells yielded material enhancing cell proliferation. The material was partially characterized. (L. V. Scott)

69-360 ATTEMPTS TO DEMONSTRATE SERUM ANTIBODIES TO VIRUS-INDUCED TUMOR-SPECIFIC TRANSPLANTATION ANTIGENS BY MEANS OF THE MIXED HEMADSORPTION REACTION. (E.) Barth, R. F., K. K. Takemoto, R. A. Malmgren and A. S. Rabson. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 15-16 (Abst. #14) 1968.

Humoral antibodies to tumor-specific transplantation antigens could not be demonstrated by mixed hemadsorption methods. (NCI)

69-361 ESTABLISHED CELL LINE FROM AN INBRED MOUSE STRAIN FOR VIRAL TRANSFORMATION STUDIES. (E.) Takemoto, K. K., R. C. Y. Ting, H. Ozer and P. Fabisch Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 14 (Abst. #9) 1968.

A continuous cell line was established from kidneys of 10-day-old AL/N mice. Epithelial and fibroblast-like cell populations were established. Differences were reported in their susceptibility to lytic and transforming infections by certain oncogenic viruses. (NCI)

69-362 THE DIFFERENCE IN CONTACT INHIBITION OF CELL REPLICATION BETWEEN NORMAL CELLS AND CELLS TRANSFORMED BY DIFFERENT CARCINOGENS. (E.) Borek, C. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 13 (Abst. #6) 1968.

Transformation results in an alteration of regulatory mechanism, in that normal cells can be contact inhibited by the same and by different cell types, whereas transformed cells can be inhibited only by a different cell type. (NCI)

69-363 MAREK'S DISEASE. II. PROPAGATION OF THE CONNECTICUT-A ISOLATE IN CELL CULTURES. (E.) Kottaridis, S. D., R. E. Luginbuhl and T. N. Frederickson. Avian Dis. 12(2):246-258, 1968.

Birds infected with the Conn-A isolate and showing clinical signs of Marek's disease were used for collecting bone marrow. The bone marrow was injected into chicken embryo fibroblast cell cultures (CEF). Line 7- chicks obtained from the USDA Regional Laboratory, East Lansing, Mich., were used for bioassay of inoc. and uninoc. CEF. A CPE was observed in chicken embryo fibroblasts inoc. with the Conn-A Marek's disease agent. The inoc. cell cultures produced Marek's disease when inj. back into Line-7 chicks. (NCI)

69-364 EFFECT OF LYMPHOID LEUKOSIS AND MAREK'S DISEASE ON THE IMMUNOLOGICAL RESPONSIVENESS OF THE CHICKEN. (E.) Purchase, H. G. (Poultry Res. Station, Houghton, Hunts, England), R. C. Chubb and P. M. Biggs. J. Nat. Cancer Inst. 40(3):583-592, 1968.

Susceptible chickens infected with lymphoid leukosis viruses presented a significant reduction in antibody response to bovine serum albumin. Graft-versus-host reaction and skin graft rejection times gave equivocal results. Susceptible chickens infected with Marek's disease agent showed an enhanced graft-versus-host reaction; homograft rejection was delayed and antibody response was decreased. No decrease in γ-globulin was observed on immunoelectrophoresis. (E. Y. Lasfargues)

69-365 HIGH TITERS OF INFECTIOUS MURINE LEUKEMIA VIRUS PROPAGATED IN VITRO. (E.) Tyndall, R. L., N. D. Bowles, J. A. Otten and A. C. Upton. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 14-15 (Abst. #11) 1968.

The variant JLS V5 differs from the original Rauscher virus-infected JLS V5 culture in producing high titers of infectious leukemia virus as well as in the character of the leukemias induced. (NCI)

69-366 ELECTRON MICROSCOPIC STUDY OF VIRUS PARTICLES IN REPRODUCTIVE ORGANS OF MICE INOCULATED WITH LEUKEMIA VIRUS (MOLONEY). (E.) Chopra, H. C. and F. E. Durr. Int. J. Cancer 3(3):351-363, 1968.

Electron microscopic studies were carried out on the reproductive organs of BALB/c mice inoc. with Moloney leukemia virus. Type C particles were found in large numbers in testis, seminal vesicles, prostate, vas deferens, vas efferens and ovary. In addition, type A particles were found in the vas deferens and vas efferens. Small numbers of type A particles were found in control Balb/c mice (the biological significance of these findings is unknown) but no type C particles were found. These findings suggested the possibility of transmission of the virus infection by coitus. (R. R. Dourmashkin)

69-367 EFFECTS OF THIAMINE DEPRIVATION ON FRIEND VIRUS LEUKEMIA IN MICE. (E.) Judge, J. R. Proc. Soc. Exp. Biol. Med. 128(1): 98-103, 1968.

DBA/2 mice infected with Friend leukemia virus and maintained on a thiamine-free diet showed no histological or clinical manifestations of leukemia, compared with controls on a normal diet. Aliquot groups originally thiamine-deprived and subsequently refed thiamine developed gross splenomegaly and histological evidence of leukemia. Similarities in preparation of materials from shellfish extracts in experiments to produce a "thiaminase," ichthiamin, and those used in antineoplastic experiments suggest a correlation in mechanism of action: thiamine inhibition. (NCI)

69-368 VIRUS PARTICLES IN BONE MARROW MEGAKARYOCYTES AND SUSCEPTIBILITY OF MICE TO VIRUS-INDUCED LEUKEMIA. (E.) Pennelli, N., L. Chieco-Bianchi, G. Tridents and L. Fiore-Donati. Int. J. Cancer 3(3):390-396, 1968.

Bone marrow megakaryocytes from C57BL mice inoc. at birth with Graffi virus showed type C virus particles, but C57BL mice inoc. as adults with Graffi virus or inoc. at birth with Gross virus, did not show particles in megakaryocytes. Bone marrow megakaryocytes of C3Hf/Gs mice inoc. at birth with Gross virus showed increasing numbers of particles with time during the preleukemia period. No studies were indicated of untreated controls, nor was there any indication of the number of samples examined in order to get the quantitative results that were reported. (R. R. Dourmashkin)

69-369 IMMUNOLOGIC STUDY OF TISSUE ANTIGENS IN MICE WITH VIRAL LEUKEMIA. (Rus.) Shershulskaia, L. V. Vop. Onkol. 14(3):21-26, 1968.

Two distinct antigens were uncovered in the tissues of mice with leukemias produced by Friend, Mazurenko, Moloney, Rauscher and Graffi viruses. The antigens (uncovered by precipitation in agar) were absent in the comparable tissues of normal mice of same strains. Comparative studies of the soluble tissue antigens from leukemic mouse tissues in cross-reaction with γ-globulin fractions of exhausted rabbit antisera indicated the presence of both common and the distinct components. (T. I. Malinin)

69-370 INTERFERON AND MURINE LEUKEMIA.-IV. FURTHER STUDIES ON THE EFFICACY OF INTERFERON PREPARATIONS ADMINISTERED AFTER INOCULATION OF FRIEND VIRUS. (E.) Gresser, I. (Inst. of Scientific Res. on Cancer, 94-Villejuif, France), R. Falcoff, D. Fontaine-Brouty-Boye, F. Zajdela, J. Coppey and E. Falcoff. J. Nat. Cancer Inst. 40(3):791-797, 1968.

Admin. of conc. preparations of crude or highly purified mouse brain interferon (1 inj/day s.c.) inhibited the multiplication of Friend virus and the development of splenomegaly in Swiss mice. Initiation of continued interferon treatment 1 wk. after viral inoc., at a time when splenic enlargement had already developed, still significantly inhibited the further development of the splenomegaly. Interferon admin. for only 1 wk. after viral infection was ultimately ineffective. Far fewer foci of Friend cells were observed in the spleens of interferon-treated mice than in the spleens of untreated mice. It is suggested that inhibition of splenomegaly resulted from continued inhibition of viral multiplication. (E. Y. Lasfargues)

69-371 THE CELL CYCLE OF LEUKEMIA L1210 CELLS IN VIVO AND IN VITRO. (E.) Wheeler, G. P. (Southern Res. Inst., Birmingham, Ala.), B. J. Bowdon, L. J. Wilkoff and E. A. Dulmadge. J. Nat. Cancer Inst. 40(3):903-906, 1968.

The cell cycles of leukemia L1210 cells proliferating in mice after serial transplantation, proliferating in mice following inoc. of cultured cells, and proliferating in vitro in spinner cultures were examined by the method of waves of labeled mitoses following pulse exposure to thymidine-(methyl-^3H). The cycles for the 3 groups of cells were essentially the same, the mean generation time being 15.7 hr. (E. Y. Lasfargues)

69-372 TISSUE CULTURE ASSAY OF MURINE LEUKEMIA VIRUS HELPER ACTIVITY FOR MURINE SARCOMA VIRUS. (E.) O'Connor, T. E. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 38 (Abst. #76) 1968.

Infection of mouse cell cultures with murine leukemia virus promoted induction of foci of morphologically altered cells on coinfection with murine sarcoma virus (MSV). This permits a quantitative formulation of the helper activity of murine leukemia virus. (NCI)

69-373 CELLULAR MODULATION OF A MURINE SARCOMA-LEUKEMIA COMPLEX. (E.) Fischinger, P. J. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 39 (Abst. #79) 1968.

Moloney sarcoma virus can cause transition from the defective to the competent state and its converse; this is termed "modulation" and depends on the cell type in which the virus replicates. In the defective state MSV, requires coinfection with leukemia virus for replication and focus formation. Because of the virus behavior in certain cell systems, it is postulated that competent MSV is a leukemia-sarcoma virus hybrid. (NCI)

69-374 CHARACTERISTICS OF THE IN VITRO ASSAY OF MURINE SARCOMA VIRUS (MOLONEY) AND VIRUS-INFECTED CELLS. (E.) Bather, R. (NCI Canada, Saskatoon, Saskatchewan), A. Leonard and J. Yang. J. Nat. Cancer Inst. 40(3):551-560, 1968.

Optimum conditions to obtain a reliable and sensitive assay of the Moloney sarcoma virus in vitro included the use of 15-day embryos as a source of primary cells; infection at the time the secondary cultures are planted and allowing the inoculum to be left in contact with the indicator cells. A most important factor in focus formation appears to be virus release and reinfection of neighboring cells. (E. Y. Lasfargues)

69-375 TUMOR INDUCTION IN THYMECTOMIZED RATS BY MURINE SARCOMA VIRUS (MOLONEY) AND PROPERTIES OF THE INDUCED VIRUS-FREE TUMOR CELLS. (E.) Ting, R. C. (NCI, Bethesda, Md.). J. Nat. Cancer Inst. 40(3):778-781, 1968.

Murine sarcoma virus (Moloney) rarely induces tumors in intact newborn rats. When rats were thymectomized at birth and infected within 2-3 days, 30-50% developed tumors. One of the transplantable tumors established in tissue culture was free of infectious virus, but possessed tumor-specific antigen as demonstrated by transplantation resistance tests. The defective sarcoma viral genome could be rescued either by superinfection of a mixed culture of tumor cells and mouse embryo cells with leukemogenic viruses or by direct superinfection of tumor cells. It was possible to assay the rescuing-activity quantitatively with given preparation of leukemogenic virus. (E. Y. Lasfargues)

69-376 RELEASE OF LEUKEMIA VIRAL PARTICLES FROM MURINE MAMMARY AND EMBRYO CELL LINES EXPOSED TO BITTNER VIRUS. (E.) Lasfargues, E. Y., J. C. Lasfargues, N. Pillsbury and D. H. Moore. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 38 (Abst. #77) 1968.

In mammary tissues from virgin, agent-free mice inoc. of mammary tumor virus (MTV) extended the life of the cells in culture. Cell lines have been established following exposure to MTV. The presence of C particles (which differ morphologically from B particles of MTV) seems to indicate the presence of a defective form of MTV. (NIH)

69-377 ELECTRON MICROSCOPIC AND BIOASSAY STUDIES OF MILK FROM MICE OF HIGH AND LOW MAMMARY-CANCER AND HIGH AND LOW LEUKEMIA STRAINS. (E.) Dmochowski, L. (U. Texas M. D. Anderson Hosp., Houston), P. L. Langford, W. C. Williams, A. G. Liebelt and R. A. Liebelt. J. Nat. Cancer Inst. 40(6):1339-1358, 1968.

Type B virus particles were found in the milk of high and low-cancer strain mice; C particles were also observed in some strains. A high correlation between B particles and tumor-inducing activity was found in RIII, A, BALB/c and CBA mice. Structures resembling lactic dehydrogenase virus were found in several low-cancer strains. (NCI)

69-378 BUDDING B PARTICLES IN NEGATIVE-STAINED WHOLE-MOUNT PREPARATIONS OF CULTURED MOUSE MAMMARY TUMOR CELLS. (E.) Lasfargues, E. Y. and D. H. Moore. Proc. Tissue Culture Assoc. 19th Ann. Meet., June 10-13, p. 16 (Abst. #15) 1968.

Sensitive methods were devised for detecting budding B virus particles in cultured mouse mammary tumor cells. (NCI)

69-379 EARLY RELEASE OF GROWTH INHIBITION IN CELLS INFECTED WITH ROUS SARCOMA VIRUS. (E.) Rubin, H. and C. Colby. Proc. Nat. Acad. Sci. USA 60(2):482-488, 1968.

Under certain conditions of tissue culture, chick embryo cells infected with RSV continued to multiply after uninfected cells almost ceased multiplying. Results indicate that those changes which underlie the escape of RSV-infected cells from normal self-regulation occur within 24 hr. after infection. (A. O'C. Deeney)

69-380 EFFECT OF RETICULOENDOTHELIAL SYSTEM STIMULATION ON RESISTANCE TO ROUS SARCOMA VIRUS INFECTION IN CHICK. (E.) Bliznakov, E. G. Int. J. Cancer 3(3):336-343, 1968.

White Leghorn chicks (17-18 days old) were inoc. in the wing web with RSV (strain VR 269). Pretreatment of such chicks with liver lipid-Restim and Rous sarcoma antibodies (prepared from adult chickens with slowly growing Rous tumors) reduced the tumor take and prolonged the mean latent period from RSV inoc. RSV to macroscopic evidence of tumor from 5.9 to 8.5 days. Post-treatment of RSV-challenged chicks with Restim alone increased the survival time and the tumor regression. It is suggested that stimulated immunologically activated cells destroy the sarcoma cells, but there is no histological evidence to support this theory. (F. C. Chesterman)

69-381 TRANSFORMATION OF EMBRYONIC GUINEA PIG AND GOLDEN HAMSTER CELLS BY ROUS VIRUS.

(Rus.) Martirosian, D. M., K. H. Grinberg and V. Y. Shevliagin. Vop. Onkol. 14(3):8-11, 1968.

Rous chicken sarcoma cells cultured concomitantly with normal embryonic guinea pig and golden hamster fibroblasts produced transformation and malignization of these fibroblasts in 16-25 days. *In vitro* transformed cells produced fatal malignant tumors in the brains of newborn and young guinea pigs and hamsters. The guinea pig and hamster fibroblasts transformed *in vitro* contained virus tightly bound to the cell. Inj. of such living cells into chickens produced tumors, while no tumors were produced following inj. of the cultured fluid or disintegrated cells. (T. I. Malinin)

69-382 PROLONGED LACTATION IN NODULE BEARING MICE AND ITS EFFECT ON MAMMARY TUMOR GENESIS. (E.) Zeilmaker, G. H. (Netherlands Cancer Inst., Amsterdam). Europ. J. Cancer 4(4):447-448, 1968.

Mammary tumor development was studied in macroscopically tumor-free agent-positive (C3H x 020) F_1 female hybrid mice, force-bred for 5 mo. from the age of 6 wk. In controls with 5-6-wk. mammary gland regression following force-breeding, hyperplastic mammary nodules (av. 2.8/mammary gland) appeared in 8/8 and 4/8 developed 1 mammary tumor each during the regression period. The other 35 mice underwent implantation of 2 isologous pituitary grafts (under the kidney capsule) and thelectomy of all mammary glands on 1 side during the last pregnancy; prolonged unilateral lactation was then induced during this postpartum period (age 24-26 wk.). The first tumors developed in the thelectomized and lactating mammary glands of 21/35 and 14/35 mice, resp., with av. latent periods of 5.2 and 5.7 wk., resp.; the difference was not significant. In 24 mice undergoing surgical removal of the first tumors, the site of the second tumor was a thelectomized or lactating mammary gland in 13/24 and 11/24, resp., with av. latent periods of 8.1 and 8.2 wk., resp.; this difference was also not significant. By comparison, in a previously reported group of mice aged 10-12 wk. at the onset of lactation, all first tumors appeared in the thelectomized mammary glands. It is concluded that the primary effect of lactation on mammary tumor development is inhibition of mammary nodule formation, since malignant transformation in existing mammary nodules was about the same in regressing, thelectomized and lactating mammary glands. (MLI)

See also abstract nos.: 220,231,232,238,240,243,244,245,246,247,248,255,307

9-383 RECURRENT NERVE PARALYSIS IN OCCUPATIONAL AND NON-OCCUPATIONAL LUNG CANCER. (Ger.)

raus, P. (Ostrov Hosp., Czechoslovakia) and J.
oráček. Z. Laryng. Rhinol. Otol. 47(7):562-566,
968.

mong 195 lung cancer pts. seen in Horní Slavkov,
strov n.O. and Nejdek in 1960-64, 120 had non-
ccupational (112 men, 8 women) and 75 had occu-
ational cancer (all male uranium workers). Re-
urrent nerve paralysis occurred in 1/8 women and
n 17/75 (22.6%) and 12/112 (10.7%) men with
ccupational and non-occupational lung cancer,
esp. The frequency of paralysis in pts. with
ancer of the right, left or both sides was 5/38
13.2%), 11/35 (31.3%) and 1/2 (50%), resp., in
ccupational cancer, compared to 3/65 (4.6%),
/45 (17.9%) and 1/2 (50%), resp., in men with
on-occupational cancer. Paralysis was seen most
ften in cancers originating in the upper lobes
nd in small cell carcinoma. It was seen in 2/7
28.6%) with occupational and 0/13 with non-occu-
ational keratinizing squamous cell carcinoma;
/11 (9.1%) and 0/17, resp., with non-keratiniz-
ng squamous cell carcinoma; 11/35 (31.4%) and 6/20
30%), resp., with small cell carcinoma; 0/2 and
/5 (40%), resp., with anaplastic large cell car-
inoma; 0/2 and 0/1, resp., with adenocarcinoma
nd 3/18 (16.6%) and 4/56 (7%), resp., with tumors
f unknown histology. A significant age difference
as seen (52.5 ± 8.6 in pts. with occupational
ung cancer, 61.9 ± 8.5 in pts. with non-occupa-
ional cancer). Paralysis was most often caused
/ tumor cells growing into the nerve trunk.

9-384 FREQUENCIES OF LARYNGEAL CARCINOMA IN MEN AND WOMEN. (Ger.)

Škeřík, P.
Charles U., Prague, Czechoslovakia), K. Zeman
nd L. Konečný. HNO 16(7):193-195, 1968.

n 1955-1964, 379 cases of laryngeal carcinoma
ere treated at the Charles University Otolaryn-
ologic Division (Prague); only 25 (6.6%) were
omen. In comparison with the records of earlier
eriods (previously published), the proportion
f women with laryngeal carcinoma was increased.
n more than 33% of these cases in women, the
arcinoma arose either from a pachyderma or a
apilloma. Among the women the incidence of the
isease was significantly higher at an earlier age
han among the men (13/25 women and 41/354 men
ere under 50) and showed a tendency for prefer-
ntial glottal localization, compared to the pre-
ominant supraglottal localization in males. The
ourse of the disease and the therapeutic results
ere more favorable in the women than in the men.

9-385 FREQUENCIES AND RELATIONSHIPS OF LUNG AND STOMACH CANCER IN AN AUTOPSY SERIES.

Ger.) Haupt, R. (St. George Hosp., Leipzig,
ermany) and K. Weber. Zbl. Allg. Path.
11(3):222-235, 1968.

Frequencies of stomach and lung cancer (1640 and 1739/7585 cancers, resp.) in 31,411 adults over 40 (17,772 men, 14,669 women) autopsied from 1930-1939 and 1948-1963 (inclusive) were compared after standardization. Total cancer incidence in men in the earlier and later periods were 18.9% and 24.4%, resp., compared to 20.9% and 22.1%, resp., in women. The male:female ratio for both groups combined was 1.06:1.0 (4178:3407). Bronchial carcinoma was 19.5% of the total in the first period in men and 37.1% in the later period; for women the values were 2.8% and 7.5%, resp. For men the increase was significant even in the specific age groups (decades). The male:female ratios in the earlier and later groups were 6.37 and 5.58:1, resp.; frequencies increased with age in both sexes, more rapidly in males. Stomach carcinoma decreased in men (32.1% to 23.6%) and showed an insignificant gain in women (19.6% to 20.5%); male:female ratios in the earlier and later groups were 1.5 and 1.3:1, resp. As the incidence of bronchial carcinoma rose, the frequency of all other organ cancers (except gastric) increased. Parallel investigations of the frequencies of these diseases in the Leipzig region yielded similar results. A slight regressive tendency in the incidence of bronchial carcinoma in the autopsy material of the last few yr. seemed to be based in part on passing the peak of increment and in part to the result of therapy.

69-386 PRENATAL MALIGNANT TUMORS. (Ger.)

Bachmann, K. D. (U. Child. Clin., Cologne-Lindenthal, Germany) and W. Kröll. Maschr. Kinderheilk. 116(6):226-227, 1968.

Tumors identified in fetuses, premature infants and newborns (up to 14 days after birth) can be defined as "certainly prenatal." They can arise from transplacental inoc. of tumors from the mother (18 cases are known in the world literature; 9 melanomas, 7 carcinomas, 2 sarcomas) or primordial tumor formation in the fetus. During the last 15 yr., 2 newborn infants with prenatal adrenal neuroblastoma were observed at the authors' clinic (the over-all incidence is not stated), bringing the known world total of neuroblastomas diagnosed within the first 12 mo. of life to 464. The sex ratio in 343 infants described was 202 male: 141 female. The tumors were classified as "certainly prenatal" (0-14 days of life) in 140 cases, "probably prenatal" (3-12 wk. of life) in 125 cases and "possibly prenatal" (4-12 mo. of life) in 199 cases. The primary sites of the "certainly prenatal" primary neuroblastomas were adrenal in 78/140, abdominal in 26/140, mediastinal in 9/140, spinal in 9/140, unknown in 8/140, cervical in 6/140 and sacral in 4/140. Metastases were noted in 75/140, to the liver (type Pepper) in 47 (66.3%), skin (type Smith) in 10 (13.3%), liver and skin in 10 (13.3%) bones and skin in 6 (8%), skeletal system (type Hutchinson) in 1 (1.2%), and liver, bones and skin in 1 (1.3%). *In situ* neuroblastomas either regress spontaneously or (less frequently) persist and increase in malignancy.

69-387 OUR EXPERIENCE WITH RENAL TUMORS. (Sp.) Pisani Mendez, D. (U. Hosp. Caracas, Venezuela), J. Novoa R. and P. Grases. *Rev. Venez. Urol.* 19(3,4):337-343, 1968.

Between 1955-1965, 61 pts. with kidney tumors were admitted to the Luis Razetti Institute of Oncology and the University Hospital of Caracas, Venezuela. The incidence was 36/100,000 hospital admissions, somewhat lower than in other nations. The histological diagnosis was adenocarcinoma in 47/61 (68.7%), Wilms' tumor (nephroblastoma) in 16/61 (26.2%, compared to 5.6% in other unspecified studies), papillary carcinoma in 2/61 (3.2%) and teratoma in 1/61 (1.6%). Renal pelvis tumors accounted for 3.2% of the group, somewhat lower than in other reports (no other details). The incidence of right- and left-sided tumors was about the same; 2 pts. had bilateral tumors (1 adenocarcinoma, 1 Wilms' tumor). All pts. with Wilms' tumor were children (5 wk.-8 yr.; median 2.8 yr.), with a male:female ratio of 1.6:1. Most pts. with adenocarcinoma were 40-60 yr. old, with a range of 14-81 yr.; the male:female ratio was 1.4:1. Most pts. were native Venezuelans; 17/61 were foreign-born (10 in Spain).

69-388 CARCINOMA OF THE PENIS IN THE LUIS RAZETTI INSTITUTE OF ONCOLOGY AND THE UNIVERSITY HOSPITAL OF CARACAS. (Sp.) Novoa R., J. (U. Hosp. Caracas, Venezuela), D. Pisani Mendez and P. Grases. *Rev. Venez. Urol.* 19(3,4):346-351, 1968.

From 1952-1965, 114 men (age 24-92; 54/114 age 40-59 yr.) with carcinoma of the penis (96/114 Grade I-III epidermoid carcinoma; superficial in 10/114, invasive in 104/114) were admitted. The incidence was 60/100,000 hospital admissions and 2.23% of all urogenital tumors. Most pts. were mestizos, of low socioeconomic status and poor hygienic habits; 108 were natives of Venezuela and 6 were foreigners (3 from Spain, 1 each from Poland, Russia and Colombia). The tumors were located on the prepuce in 4.4%, glans in 53.9%, distal area in 21.3% and proximal area in 20.4%. A history of phimosis was obtained in 67% of the group (the history was unknown in the other 33%); 22 of these pts. had undergone surgical correction of phimosis in adulthood. No other etiologic factors were identified.

69-389 MULTIPLE MALIGNANT TUMORS. CLINICAL CONTRIBUTION. (It.) Romano, E. (U. Siena, Italy), N. Di Paolo and S. Meschino. *Minerva Med.* 59(38):2231-2238, 1968.

Multiple primary tumors were noted in 11 women and 5 men (age 33-77 at diagnosis of the first tumor; all but 2 pts. were 43-64 yr. old) seen by the authors in 1957-1967; the incidence of multiple primary tumors in the total hospital population is not stated. Triple primary tumors were seen in 3 pts.; 2/3 had spinocellular carcinoma of the skin and adenocarcinoma of the breast (at a 15-yr. interval in 1/2), 1/2 developed solid carcinoma of the thyroid 17 yr. after diagnosis of skin cancer and 1/2 developed Brill-Symmers lymphoma (the combination is very rare) 1 yr. after the diagnosis of breast cancer. The other pt. had adenocarcinoma of the breast and uterus (diagnosed 7 yr. apart) with acute myeloid leukemia (4 yr. after the diagnosis of uterine cancer). Of the 13 pts. with double primary tumors, 3/13 developed the second tumor within 1 yr. of diagnosis of the first (adenocarcinoma of the uterus and colon; spinocellular carcinoma of the tongue and undifferentiated carcinoma of the larynx; solid adenocarcinoma of the stomach and adenocarcinoma of the lung); 1 pt. developed carcinomas of the larynx and bronchus 3 yr. apart. In 3/13, the first tumor was spinocellular carcinoma of the skin (2/3) or lip (1/3); 1 pt. developed a spinocellular carcinoma of the lip 4 yr. later and 2/3 developed chronic lymphatic leukemia or reticulum cell sarcoma after 8 and 7 yr., resp. One pt. developed papillary adenocarcinoma of the uterus and adenocarcinoma of the breast at a 9-yr. interval; another pt. developed tumors of the same type at a 4-yr. interval, the breast tumor appearing first. The other 4 pts. were women with adenocarcinoma of the breast, who developed undifferentiated carcinoma of the uterus, anaplastic adenocarcinoma of the rectum, adenocarcinoma of the bronchus and gelatinous cystic carcinoma of the ovary at intervals of 3, 3, 7 and 10 yr., resp. Positive family histories were noted in 33% of the group. The female preponderance in the group reflected the high proportion of breast + female genital tumors (the possibility of hormonal interaction is mentioned). The association of solid tumors followed by leukemia or lymphoma (4 pts.) may reflect radiation injury.

69-390 DISTRIBUTION OF MALIGNANT TUMORS OF THE RESPIRATORY TRACT IN CZECHOSLOVAKIA AND OTHER COUNTRIES. (Cz.) Trefný, J. (Tuberculosis Res. Inst., Prague). *Cas. Lek. Ces.* 107(26):790-796, 1968.

The incidence/100,000 of malignant tumors of the respiratory tract in Czechoslovakia increased from 16 in 1955 to 42 in 1966 (a 163% increase); the incidence in males and females in 1960 was 56 and 8/100,000, resp., compared to 78 and 9, resp., in 1966 (increases of 39% and 13%, resp.). For the Czech region alone, the incidence in 1960 was 67 in males and 9 in females, compared to 94 and 9, resp., in 1966 (showing only an increase of 40% in males); in the Slovakian region, the incidence in 1960 was 31 in males and 6 in females, compared to 43 and 8, resp., in 1966 (increases of 39% and 33%, resp.). Morbidity among men was highest at age 65-69 yr. (489/100,000) and in women at age 80 yr. (47/100,000). Malignancy was histologically diagnosed in 1431 pts. in 1965 and 2034 pts. in 1966, while tumors not identified during life increased in that period from 2399 to 2872. Work disability due to lung, tracheal and bronchial cancer in men increased from 7/100,000 in 1959 to 12 in 1966, compared to 1-2 in women. Invalidity in men was 15/100,000 in 1960 and 11 in 1966, compared to 2 and 1, resp., in women. Mortality from lung, tracheal and bronchial cancer increased by 86% from 1955 to 1966 (22 to 41/100,000). In 1966, the morbidity/100,000 of lung, tracheal and bronchial cancer was 69 for men and 7 for women and the mortality rate was 75 and 9, resp. A comparison of morbidity rates of lung, tracheal and bronchial cancer in Czechoslovakia, England and Wales, U.S. (Connecticut), New Zealand, Sweden, Israel and Hungary (in decreasing order of incidence in men) in 1963 showed Czechoslovakia second to England and Wales (E/W) in the male incidence (58.3 and 87.5/100,000, resp.); the female incidence was behind only E/W, the U.S. and Sweden (6.5, 13.3, 9.3 and 6.7, resp.) in 1963.

69-391 PRIMARY CANCER OF THE GALLBLADDER.

(It.) Dalmasso, A. (Riuniti Hosp., Rome). Rass. Clin.-Sci. Ist. Biochim. Ital. 44(5):147-155, 1968.

Primary adenocarcinoma of the gallbladder was found at surgery in 13/about 650 pts. with various liver diseases from 2 Roman hospitals; 41 additional autopsy cases are also reported. The female:male ratio in this group was 10:1. Biliary calculi were assocaited with gallbladder cancer in 94% of the group; in the operated pts., the duration of biliary calculi was over 5 yr. in 6/13, 1-5 yr. in 3/13 and under 1 yr. in the other 4/13. The primary tumor site in these pts. was the fundus in 12/54, neck in 7/54, body in 7/54 (near the liver in 2/7) and undetermined in 28/54. Metastases to the liver, peritoneum and omentum were fruquent (20, 29 and 13/54, resp.) and a few pts. had metastases to other sites (5 each lung and pleura; 4 intestine; 3 pancreas; 2 each mesentery, adrenal, ovary and abdominal wall; 1 each portal or suprahepatic vein, stomach, broad ligament and heart). Methods of metastatic dissemination (portal circulation and lymph channels) are also discussed.

69-392 DETECTION OF ASYMPTOMATIC CANCER AND EARLY DIAGNOSIS BY EXAMINATION IN COLLECTED PATIENT SERIES.

(Fr.) Delachaux, A. (45, Avenue de Rumine, Lausanne, Switzerland). Praxis (27):959-963, 1968.

A mass screening study in New York City (Strang Clinic, Memorial Hospital) revealed malignant diseases in 368/39,051 pts. (13,422 males, 25,629 females); the total incidence/1000 was 8.2 in males and 10.7 in females. Tumor frequency by primary site in these 368 pts. (number of men and women not stated) was: skin, 38.2% (male) and 15.1% (female); colon/rectum, 27.3% and 11.2%; thyroid, 3.6% and 8.9%; leukemia/lymphoma, 1.8 and 3.5%; stomach, 4.5% and 2.3%; bronchus 3.6% and 0.8%; other sites, 14.5% and 4.3%; prostate (men) 6.4%; breast and uterus (women) 29.5% and 29.4%, resp. A summary of 5 American studies (393,682 women) showed a cervicouterine cancer incidence of 2.4-11.5/1000 (av. incidence 6.5 cervix and 0.7 uterus). The morbidity rates/100,000 women/yr. in this group were: white, 4.3 (Jewish) and 17.3 (non-Jewish); Negro, 64.5; Puerto Rican, 111.5. Age-unadjusted cancer mortality rates/100,000/yr. in Switzerland from 1941-1965 remained about the same in males (174-176, except for 183 in 1951) and decreased in females (157 to 142). Lung cancer mortality increased steadily during that time (14 to 40 in males, 9 to 22 in females), while stomach cancer mortality fell (56 to 32 and 46 to 25, resp.). Mortality rates of colon cancer fell slightly (27 to 24 in males, 22 to 19 in females), as did uterine cancer mortality rates in females (19 to 16); breast cancer mortality in females increased (28 to 32), possibly because of an increase in population age. Analysis of previously published statistics from Switzerland yielded expected cancer morbidity rates of 2000-2500/100,000 in both men over 50 and women over 40 (accounting for 80% of all neoplasms in less than 40% of the population). Expected morbidity rates in men and women were: large intestine, 720 and 600; bronchus, 400 and 220; and stomach, 320 and 250, resp., in addition to 640 and 480 with breast and uterine cancer (women), resp.

69-393 EPIDEMIOLOGICAL AND CLINICAL STUDY OF 987 CASES OF CANCER OF THE CERVIX UTERI.

(Sp.) Alvarez Alva, R. (Mexican Inst. Social Security, Mexico City). Gac. Med. Mex. 97(4):468-474, 1968.

A mass screening study of 183,790 Mexican women (126,631 or about 70% age 20-39; range <20->70 yr.) showed Class III-V cervical smears in 1738 (9.5%). Follow-up examination of 1599/1738 showed cervical cancer in 987 (60%), cervicitis in 117 (14%) and dipkaryosis, metaplasia and dysplasia in 495 (28%). The over-all prevalence of cervix cancer and metaplasia in the entire group was 5.8 and 2.9/1000, resp. In the pts. with cancer, the prevalence increased from 0.8 and 1.8/1000 at age <20 and 20-29, resp; to 6.7 at age 30-39, 11.8 or 11.2 at age 40-59, 12.6 at age 60-69 and 1.5 at age 70+; 500/987 (50.7%) were 35-44 yr. old. Stage 0 cancer was seen in 698/987 (71%), most of whom were under 40; Stage I disease was seen in 158/987 (16%) and Stage II-IV disease in 131/987 (13%). Only 272/987 (27.4%) presented with symptoms of gynecological disease, indicating the importance of the Papanicolaou test for early detection.

69-394 DISTRIBUTION OF DIFFERENT PATTERNS OF CANCER. (E.) Higginson, J. (Int. Agency Res. Cancer, Lyon, France). Israel J. Med. Sci. 4(3):457-468, 1968.

Age-adjusted incidence rates for leukemia and many solid cancers (respiratory, g.i., breast, cervix, endometrium and skin) in many nations are presented. The total cancer incidence/100,000 /yr. in males and females was: U.S., 304.3 and 248.6; Canada, 266.9 and 220.1; United Kingdom, 210.1 and 169.6; Denmark, 204.9 and 217.4; Jamaica, 175.4 and 186.3; Colombia, 271.1 and 304.7; Chile, 139.6 and 155.9; Mozambique, 186.7 and 123.3; Nigeria, 82.7 and 95.7; Uganda, 58.9 and 79.5; Japan, 192.1 and 151.5; and Singapore, 117.2 and 81.5, resp. The geographical differences noted are attributed for the most part to environmental rather than genetic factors. Tumors discussed include cancer of the lung (related to smoking, air pollution and occupational exposure), liver (especially in Mozambique and South African Bantus), esophagus (a recent marked increase in South Africa, the Caribbean, the Far East, southern U.S.S.R. and the Middle East cannot be explained), sinuses (southern Africa; related to the use of snuff made from aloe leaves), cervix (related to low socioeconomic status, poor hygiene and early marriage and pregnancy), breast and uterus (apparently related to nutritional factors, parity and lactation) and g.i. tract (apparently related to nutritional factors) and the "African lymphoma" (possibly virus-induced).

69-395 STUDY OF THE RELATIONSHIPS OF DIFFUSE PULMONARY FIBROSIS AND CANCER (3 CASES). (Fr.) Lesobre, R. (Beaujon Hosp., Clichy, France), M. Oury and B. Duflo. Rev. Tuberc. (Paris) 32(2):137-166, 1968.

Autopsy findings of 2 men (age 64-67) and 1 women (age 73 yr.) with diffuse interstitial fibrosis (DIF) of the lungs associated with lung carcinoma are discussed. In 1/3, the DIF was of unknown cause and about 1 yr. duration and the relationship between it and the lung tumor (undifferentiated large cell carcinoma) could not be determined. The woman had an 8-yr. history of scleroderma and Thibierge-Weissenbach calcinosis of the fingers before the onset of respiratory symptoms; DIF was noted at autopsy, with a large alveolar carcinoma at the site of 1 area of pulmonary sclerosis and many small lung tumors. The other pt., a heavy smoker, had been treated for 9 yr. for rheumatoid arthritis and had DIF of at least 6 yr. duration; he was admitted with symptoms of severe scleroderma. A cavitated lesion of 1 lung was noted on X-ray; autopsy demonstrated a cylindrocubical cell carcinoma with similar tumors in 1 kidney and both adrenals, but the lung tumor did not resemble a typical alveolar cell carcinoma or metastatic kidney carcinoma. The 18 other reported cases of lung cancer (14 were women) with scleroderma and DIF are discussed; the association of lung cancer with other collagenoses, sarcoidosis, pneumoconiosis and asbestosis is reviewed (85 references).

69-396 POSSIBLE SYNTROPY BETWEEN PEPTIC ULCER AND BRONCHIAL CARCINOMA. (Ger.) Salzer, G. M. (U. Innsbrück, Austria), H. Kutschera and A. Decristoforo. Bruns Beitr. Klin. Chir. 216(4):316-321, 1968.

Data on an unselected series of 12,867 adults over 30 autopsied at the University of Innsbrück from 1930-1964 (except 1940-1944) were analyzed. Lung and bronchial cancer was seen in 467/7130 men (6.5%) and 86/5737 women (1.5%). The lung cancer incidence was much higher in men with peptic ulcers and ulcer scars (54/529 = 10.2%) or gastrectomized men (46/398 = 11.5%) than in men without chronic gastroduodenal disease (367/6203 5.9%); the ulcer incidence in men with lung cancer (including gastrectomized pts.) was significantly higher (100/467 = 21.3%) than in the group as a whole (927/7130 = 12.9%). This correlation between lung cancer and peptic ulcer was not seen in the women. The lung cancer incidence in women with ulcers, gastrectomized women and women without chronic gastroduodenal disease was 2.5% (7/280), 1.6% (2/124) and 77/5333 (1.4%), resp.; the ulcer incidence in women with and without lung cancer (including gastrectomized pts.) was 9/86 (10.4%) and 395/5651 (7.0%), resp., but the difference was not significant. The overall cancer incidence in pts. undergoing ulcer surgery was 127/526 (24.1%), compared to 23.8% (3235/13,589) in an unselected group of autopsied pts. over 20, suggesting that gastrectomy itself does not increase the cancer risk. Data on smoking were not discussed for these pts., but the increased risk of both peptic ulcer and lung cancer in heavy smokers is pointed out and briefly discussed.

69-397 EPIDEMIOLOGY AND HISTOLOGY OF ORAL LEUKOPLAKIA AND LEUKOEDEMA AMONG PAPUANS AND NEW GUINEANS. (E.) Pindborg, J. J. (Dept. Pub. Health, Konedobu, New Guinea), D. Barmes and B. Roed-Petersen. Cancer 22(2): 379-384, 1968.

The oral mucosa of 605 men and 621 women over 20, from 3 areas of Papua and New Guinea (179 men and 160 women from the south coast, within 30 miles of Port Moresby; 85 men and 198 women from the north coast, within 10 miles of Madang; 341 men and 263 women from the Western Highlands, within 10 miles of Mount Hagen) was examined. In these 3 areas, 76.5%, 97.6% and 74.5% of the men and 33.8%, 82.8% and 78.3% of the women, resp., were smokers; betel nut chewing was reported by 79.3%, 95.3% and 46.0% of the men and 83.8%, 95.5% and 1.9% of the women, resp. In addition to the lower prevalence of betel usage, there was a significant difference between the highlanders and coastal dwellers in the type of tobacco smoked. Nearly all of the coastal people used "tailor-made" cigarettes or "sticks" (imported tobacco wrapped in newspaper); many highlanders smoked home-cured tobacco wrapped in leaves of certain bushes, as well as tailor-made cigarettes and sticks. Betal nut chewing was an important part of the smoking habit pattern in the coastal areas, but not in the highlands. The total prevalence of leukoedema of the oral mucosa was 2.4% in the south coast (3.9% in men, 0.6% in omen), 4.2% in the north coast (4.7% and 4.0%, esp.) and 16.9% in the highlands (19.6% and 13.3%, esp.). The prevalence of preleukoplakia in these areas was 10.6% (14% and 6.9%, resp.), 2.0% (18.8% and 9.1%, resp.) and 13.4% (15.8% and 10.3% resp.). The leukoplakia prevalence was 6.2% (10% and 1.9%), 5.7% (7% and 5.1%) and .1% (3.8% and 2.3%), resp. Leukoplakia was significantly more frequent in the coastal areas than the highlands and leukoedema in the highlands; the preleukoplakia prevalence was about the same in all groups. The sex difference was significant for all diseases. No epithelial atypia, carcinoma *in situ* or carcinoma was noted in 26 biopsy specimens. It is suggested that smoking may be more closely associated with the isk of these conditions than previously believed.

9-398 EVALUATION OF DETECTABILITY OF THE UTERINE CERVIX CANCER IN THE WARSAW ITY AREA IN THE YEARS 1965-1966. (Pol.)

isiewicz, L. (Inst. of Mother's and Children's ealth, Warsaw). *Ginek. Pol.* 39(7):763-767, 1968.

pprox. 75,000 initial gynecological examinations nd 31,050 initial cytological examinations were erformed in the Warsaw area in 1965, compared to 1,000 initial gynecological and 34,600 initial ytological examinations in 1966. In 1965, 363 ervix carcinomas (157 pre-invasive, 206 invasive, tage I-IV) were detected (0.41% of all cytological xaminations), compared to 417 cervix carcinomas 176 pre-invasive, 241 invasive, Stage I-IV; .47% of all cytological examinations) in 1966. his increase in detected cervix carcinomas (by 14.8%) and preinvasive carcinomas (by 12%) as accompanied by a 61% increase of histopathologically confirmed atypia of the cervix (from 586-939 cases) and was attributed to ncreasing diagnostic efficiency.

9-399 BREAST CANCER AND ARTIFICIAL MENOPAUSE: A COHORT STUDY. (E.)

Feinleib, M. (Harvard Sch. Pub. Health, Boston, Mass.). *J. at. Cancer Inst.* 41(2):315-329, 1968.

reast cancer morbidity and mortality rates as of he end of 1961 were calculated for 9137 women ndergoing complete or partial hysterectomy CH or PH; 3241 and 2149, resp.) or radiation astration (RC; 1518) for benign uterine iseases, or treated for genital or other pelvic cancer (750 pts.), from 1920 through 1940. Controls included 953 women undergoing cholecystectomy (CX and 526 in natural menopause (NM) at the time of hysterectomy. Pts. with known histories of prior mastectomy or treatment for breast cancer, pts. not surviving the index admissions, pts. of unknown parity, pts. undergoing bilateral oophorectomy (oox.) alone, pts. in NM before age 40, and non-residents of Massachusetts were excluded. The age at initial admission was under 40 in 3956/9137, 40-44 in 2214 and 45-55 in 2967; 89% were married, 73% had 1 or more live-born children, 8% were nonwhite and 58% were nativeborn. Breast cancer developed in 10/750 pts. treated for pelvic neoplasms and 7/10 died of breast cancer; the observed/expected (O/E) ratio was not significantly changed (expected 14.6 cases, 7.8 deaths). In the pts. treated for benign diseases (including both control groups), the corrected O/E ratio of mortality from causes other than breast cancer was 1560/2143 (0.728), a significant reduction. No significant differences were noted among the individual cohort groups according to age and/or type of treatment (including both control groups). The O/E breast cancer mortality ratio in pts. with benign diseases was 54/80 (0.68). Analysis of individual cohort groups showed a significant reduction in O/E breast cancer mortality only in pts. under 40 undergoing CH (O/E = 3/11.31 = 0.27. The total O/E breast cancer morbidity in pts. with benign disease was 108/157.1 (0.69). Significant differences in mortality in individual cohort groups were seen only in pts. under 40 undergoing CH including bilateral oox. (O/E = 3/11.31 = 0.27), compared to either pts. under 40 undergoing CX (O/E = 5/3.05 = 1.64) or the combined group undergoing CX and PH (O/E in these 2 groups 13/12.41). The breast cancer mortality in women age 40-44 treated by RC was also significantly reduced (O/E = 2/5.58 = 0.36). No significant difference among cohort groups was seen between women in NM or artificial menopause (all ages), CH and NM groups (all ages) or PH and CX groups (pts. under 40). It is concluded that the risk of breast cancer can be reduced almost 75% by artificial menopause only in pts. under 40 and only if bilateral oox. is performed.

69-400 BURKITT'S TUMOUR IN NORWAY: A SURVEY OF POSSIBLE CASES OCCURRING IN THE PERIOD 1953-1962. (E.)

Iversen, O. H. (U. Oslo, Norway) and R. Harket. *Europ. J. Cancer* 4(4): 383-389, 1968.

The 1953-1962 records of the Norwegian Cancer Registry disclosed 112 pts. under 20 with lymphosarcoma or suspected lymphosarcoma; 80/112 showed non-leukemic lymphosarcoma (58/80 were under 15). Widespread disease was noted in 16/80 (20%), peripheral lymphadenopathy in 30/80 (37.5%) and extranodal tumors in 34/80 (42.5%; abdomen 9/34, jaw and facial bones 8/34, ovary 0/34, other 17/34). None of the pts. showed clinical signs pathognomic for Burkitt's lymphoma, but 13 children showed tumor patterns resembling this tumor. However, the histological diagnosis in 10/13 with initial involvement of the jaw and facial bones (7/10), other bones (2/10) or multiple abdominal tumors (1/10) was lymphosarcoma. In the other 3/13 and 5 additional pts., the histological diagnosis was Burkitt's lymphoma; 3/8 showed g.i. involvement (colon in 1, stomach in 2), but none showed bone or jaw involvement at diagnosis or during follow-up. Malignant lymphomas accounted for 5.5% of the 1089 cancers seen in this study of Norwegian children (age 0-14 yr.); the lymphoma incidence was 0.7/100,000 children/yr. (all tumors, 12.1), compared to 8.9 in Ibadan (all tumors, 12.6). It is suggested that Burkitt's lymphoma is not an "African disease" or a unique disease entity, but rather a rapidly growing form of childhood lymphosarcoma.

69-401 CANCER IN A MISSION HOSPITAL IN SOUTH AFRICA; WITH EMPHASIS ON CANCER OF THE CERVIX UTERI, LIVER AND URINARY BLADDER.

(E.) Sutherland, J. C. (Ethel Lucas Mem. Hosp., Acornhoek, Republic of South Africa). Cancer 22(2):372-378, 1968.

Data on 85 male and 126 female cancer pts. seen at the Ethel Lucas Memorial Hospital at Acornhoek (Lowveld, North-Eastern Transvaal) in November, 1957-November, 1966 were compared to data reported from several other places in southern, eastern and western Africa. Cancer of the tongue, stomach, sinuses and nose was comparatively infrequent at Acornhoek (stomach cancer was seen in 0/85 men and 1/126 women; the other tumors were not seen). No cases of the Burkitt lymphoma were seen. The breast cancer frequency in males and females was 3/85 and 10/126, resp. Tumors of high comparative frequency at Acornhoek included cancer of the esophagus (5/85 men, 1/126 women), liver (28/85 and 7/126), pancreas 5/85 and 4/126), bladder (6/85 and 18/126) and cervix uteri (51/126 women, + 2 carcinoma *in situ*). The relative frequency of primary liver cancer at Acornhoek (32.9 in males, 5.6 in females) was second only to that in Lourenco Marques (65.5 and 31.0) and higher than in rural Transvaal (22.1 and 6.4), Johannesburg (23.1 and 5.6), Kyadondo (14.1 and 3.4) and Ibadan (13.2 and 2.7); possible etiologic factors discussed include virus hepatitis, pellagra, kwashiorkor and mycotoxicosis. The high incidence of cervix cancer at Acornhoek was apparently not related to multiparity, circumcision of the husband (almost universal in men of 1/3 of the tribes studied, although no tribal differences in cervix cancer incidence were seen) or schistosomiasis. The sex ratio in the bladder cancer pts. was reversed to 1/2.6 (6 males, 18 females). This was the only group showing a significant tribal difference; the bladder cancer risk in Shangaan and Swazi pts. was 4-fold higher than in Sotho pts. Schistosomiasis was less frequent in normal control men (who usually work in urban areas where the infection risk is lower) than in women, and irrigation systems (a potential source of infection) are most commonly found in areas where the Shangan and Swazi tribes predominate, but the occurrence of schistosomiasis in bladder cancer pts. showed no significant tribal differences.

69-402 PATHOLOGY OF SKIN TUMORS FOUND ON ENGLISH SOLE AND STARRY FLOUNDER FROM PUGET SOUND, WASHINGTON.

(E.) McArn, G. E. (U. Oregon Med. Sch., Portland), R. G. Chuinard, B. S. Miller, R. E. Brooks and S. R. Wellings. J. Nat. Cancer Inst. 41(1):229-242, 1968.

Skin tumors were found in 156/3619 pleuronectid fish of 4/10 species collected in Puget Sound on five occasions from March, 1965-June, 1966. The number of tumor-bearing fish was highest in November, 1965 and March, 1966, particularly in fish from the Bellingham area (compared to Port Susan and Port Gardner). The tumor frequency was 5.4% (57/1063) in Plactichthys stellatus (starry flounder), 5.2% (93/1792) in Parophrys vetulus (English sole), 3.3% (3/90) in Psettichthys melanostictus (sand sole) and 0.7% (3/430) in Isopsetta isolepis (butter sole). The tumors of smaller, younger fish were usually angioepithelial nodules (particularly in P. vetulus); older fish (1 yr. and over) showed more advanced epidermal papillomas and occasional angioepithelial polyps. Intermediate transitional stages from 1 tumor type to another were also noted. The tumor frequency was significantly higher on the pigmented, eyed surface than on the blind, nonpigmented undersurfaces, suggesting that the unknown tumor-inducing event(s) occur shortly after metamorphosis.

69-403 COMPARATIVE MORTALITY OF CHILDHOOD LEUKEMIA AND LYMPHOMA AMONG THE IMMIGRANTS AND NATIVE BORN IN ISRAEL.

(E.) Royston, I. (Tel Hashomer Gov. Hosp., Israel) and B. Modan. Cancer 22(2):385-390, 1968.

Analysis of records of all resident children (under 15) who died in Israel during 2 time periods (totals not stated) revealed 62 leukemia and 31 lymphoma cases between 1950-1954 and 170 leukemia and 86 lymphoma cases between 1958-1964. The over-all age-adjusted mortality rate for leukemia in all children in Israel rose from 2.79/100,000 in 1950-1954 to 3.58 in 1958-1964, whereas lymphoma mortality rose only slightly (1.40-1.79). A comparison of foreign-born and Israeli-born children in 1958-1964 revealed higher age-specific leukemia mortality rates in immigrants than in the corresponding native-born groups (total av. age-adjusted rates of 4.39 and 3.36/100,000/yr., resp.), except for the 5-9-yr.-old Asian-born children who had a slightly lower mortality rate than the corresponding Asian-Israelis (3.70 and 4.30/yr., resp.; total age-adjusted rates 4.13 and 4.68, resp.). The largest mortality differences were among the African groups; the rates in the African-born as more than double that of the Israeli-born fricans (4.67 and 2.01 resp.). In the foreign- orn and Israeli-born European groups, the ge-adjusted mortality rates were 4.16 and 3.37, esp. In general, the leukemia risk seemed o decrease with increasing generation number in srael. Lymphoma mortality rates in immigrants nd native-born Israeli children were about the ame (age-adjusted total 1.95 and 1.74, resp.). he data suggested that leukemia and lymphoma ave different epidemiological features and that n leukemia some environmental factors affected he foreign-born children more than the Israeli- orn. One of those could have been increased xposure to radiation, especially among the frican children who received radiation treatment or ringworm of the scalp (about 20,000 immigrant hildren, mostly from Africa, were so treated in 949-1958; another may be maternal age (lower in he Asian and African groups).

9-404 WORLD MAPS OF CANCER MORTALITY RATES AND FREQUENCY RATIOS. (E.) Dunham, L. . (NCI, Bethesda, Md.) and J. C. Bailar III. J. at. Cancer Inst. 41(1):155-203, 1968.

orldwide incidence and mortality data (age- djusted to 1950 U.S. census data) for the most ommon tumors (10 sites in men, 5 in women) are resented. Oral and pharyngeal cancer frequen- ies (men) were high in Asia, Morocco, Hungary, he Malagasy Republic, Latin America and parts f the West Indies, and low in North America, orthern Europe and most of Africa. Patterns in omen were about the same (excepting a compara- ively high frequency in U.S. nonwhites and some arts of Africa). Esophageal cancer (males) was ow in most of Africa and high in South Africa, arts of Asia and Latin America, India, France nd Switzerland. Patterns in women were about he same except for a reversal of the male fre- uencies in France and Switzerland (low mortality ates), Ireland, Scotland and Israel (high mor- ality rates). Esophageal cancer mortality in .S. nonwhites is increasing rapidly in both exes (especially men). Stomach cancer rates and atios (both sexes) were high in the USSR, Fin- and, Central Europe, Japan, Iceland and Latin merica and low in North America, Africa and outhern or Southeast Asia. Intestinal and rectal ancer (both sexes) was frequent in Eastern North merica, most of Western Europe, Australia and ew Zealand, with an unexplained increase in a Plata (Argentina) by comparison to other cities f Latin America; the frequency was generally ow in tropical and subtropical areas throughout he world. Liver and biliary tract cancer (males) as frequent in Africa, some parts of Asia, Greece nd Italy; larynx cancer (males) was frequent in atin America, France, North Africa, the Eastern editerranean and India. Lung and bronchus can- er rates (males) were low in most parts of Asia nd Africa and high in all areas with registra- ion systems supplying data for mortality rate calculation. Breast cancer (females) was rather low in the USSR and some parts of the Far East, Africa and the Caribbean; it accounted for about 25% of all female tumors worldwide. Cervical cancer was high in Latin America, parts of Africa and Asia and low in Europe, Australia-New Zealand and North America (especially U.S. white). Bladder cancer (males) seemed to be frequent in Egypt, Mozambique and Argentina (La Plata) and low in Asia, the Caribbean, Ireland, Scandinavia and the southern U.S. Prostatic cancer was infrequent in most of Asia, Africa and Latin America; no clear patterns were noted elsewhere, except for a possible environmental difference in U.S. nonwhite men (the highest rate noted, compared to low rates in Asia and Africa). No clear geographical pattern was seen for the leukemias and the mortality rate spread was narrow.

69-405 LEUKOCYTE GROUPS AND ACUTE LEUKEMIA. (E.) Kourilsky, F. M. (St. Louis Hosp., Paris), J. Dausset, N. Feingold, J. M. Dupuy and J. Bernard. J. Nat. Cancer Inst. 41(1):81-87, 1968.

The distribution of 10 leukocyte antigens of the HL-A system was studied by lymphocytotoxicity tests (+ complement fixation for 4/10 antigens) in WBC from 116 pts. (62 male, 54 female; age 4-75 yr., mean 13 yr.) with acute lymphoblastic (ALL; 102) or myeloblastic (AML; 14) leukemia. All pts. were in complete remission at the time of study and 46 had been in complete remission for over 1 yr. The ABO and Rh blood group distribution was the same in these pts. as in the general population. Controls included 221 healthy subjects and 13 pts. with unspecified diseases other than leukemia (174 male, 60 female; age 17-81 yr.). All subjects in both groups were Caucasian and most were born in France (108/116 with leukemia, 222/234 controls). No significant difference in antigen distribution was seen between the leukemia pts. and the controls. The lymphocyte reactivity was somewhat weaker in the leukemia pts. (41.4% of 4093 reactions were positive) than in control (45% of 8282 reactions), and the lymphocyte reactions were weaker in the 45 pts. in prolonged remission (39.1% of 1583 tests were positive) than in control group (45%). This difference was not seen in the complement fixation tests. Another study of 102 pts. with ALL gave similar results. There was no significant difference in antigen distribution between pts. with ALL and those with AM. It is tentatively concluded that a close relationship between a predisposition to acute leukemia and the HL-A antigen system is unlikely.

69-406 LYMPHOSARCOMA (LEUKEMIA) IN CATTLE, SHEEP AND PIGS IN GREAT BRITAIN. (E.) Anderson, L. J. (U. Glasgow, Scotland) and W. F. H. Jarrett. Cancer 22(2):398-405, 1968.

A histological survey of specimens from 100 abattoirs in Great Britain from Oct. 1965-Sept. 1966 (covering about a third of all animals slaughtered during that time) revealed malignant tumors in 302/1.5 million cattle, 107/4.5 million sheep, and 139/3.7 million pigs, of which 75/302, 44/107 and 92/139, resp., were lymphosarcomas (incidence 58, 10 and 25/million slaughtered, resp.). The incidence of lymphosarcoma in young cattle was high; 26/75 (35%) occurred in animals less than 2 yr. old (5/26 were calves under 2 mo.) and 46/75 (61%) were under 4 yr. old. The lymphosarcoma incidence among calves was 79/million, compared to 55/million in slaughtered adult cattle; 11/75 were males (8/11 under 1 yr.), 10/75 were castrated males and 54/75 were females. Most of the ovine cases were in mature ewes (39/44), the youngest affected sheep was 8 mo. old. In pigs the incidence was higher in animals less than 6 mo. old; 54/92 (59%) of porcine cases were in immature animals. In cattle, the most common tumor site was thymic lymphosarcoma (53% thymic, 44% multicentric, 3% skin type). In sheep, 33/44 (75%) were multicentric, with 5 thymic and 6 skin forms. In pigs, 57/92 tumors (62%) were multicentric and the other 35/92 (38%) were thymic. There was no evidence of sex predisposition and no evidence of any difference according to breed. No evidence of lymphocytosis was found in blood samples from normal cattle from herds in which lymphosarcoma had occurred; no prior histories of lymphosarcoma were noted in these herds. It is concluded that lymphosarcoma in cattle (as well as in pigs and sheep) in Great Britain is a sporadic disease and differs from the "enzootic" form of bovine lymphosarcoma.

69-407 RENAL-CELL CARCINOMA IN SIBLINGS: A CASE REPORT. (E.) Klinger, M. E. (Jewish Hosp., Brooklyn, N. Y.). J. Amer. Geriat. Soc. 16(9):1047-1053, 1968.

An aged brother and sister with "silent" renal cell carcinoma of the kidney are described (bringing the total reports of familial cases to 4). The sister (66 yr. old at diagnosis) underwent nephrectomy, although a metastatic mass was inoperable, and was without signs of disease progression 3 yr. later, at the time of report. In the brother, who had been treated for urinary obstructions due to prostatic enlargement 5 yr. previously (age 74), bone metastases from renal cell carcinoma were identified a short time prior to publication; the primary kidney tumor was identified by radiography, but not clinically or by palpation.

69-408 HEREDITY AND ENVIRONMENT IN THE AETIOLOGY OF CANCER. (E.) Hadley, H. G. (Res. Found., Inc., Washington, D. C.). Panminerva Med. 10(5):210-212, 1968.

Inj. of an aqueous tissue suspension from 1 mammary carcinoma into the leaf stems of a castor bean plant gave rise to leaf spots several wk. later; these leaf spots grew an organism identified microscopically and immunologically as a variant of Bacillus cereus. An antigen from this preparation was added to sera from 472 consecutive known cancer pts. and 19,209 pts. apparently free of cancer (matched by age, sex and race). A positive reaction (macroscopic flocculation of the preparation containing 5% phenylhydrazine as indicator) was seen in 430/472 (91%) sera from cancer pts. and 249/19,209 (1.2%) control sera. False-positive reactions tended to occur in pregnancy and pts. with chronic diseases or recent blood transfusions. The presence of a substance in cancer sera usually absent from normal serum is concluded.

69-409 MYELOLIPOMAS OF THE LIVER IN CAPTIVE WILD FELIDAE. (E.) Lombard, L. S. (Loyola U., Hines, Ill.), H. M. Fortna, F. M. Gardner and G. Brynjolfsson. Path. Vet. 5(2): 127-134, 1968.

Examination of tumor material from 3451 animal autopsies at the Chicago zoo (1950-1965) revealed multiple myelolipomas (tumor-like nodules of bone marrow elements) of the liver in 4/24 wild Felidae. The Armed Forces Institute of Pathology (AFIP) collection yielded similar tumors in 3/46 wild Felidae; about 100 other specimens from wild Felidae (some from other American and European zoos; including 20 lions, 14 leopards, 16 pumas, 23 tigers and 15 cheetahs) were negative, but many of these animals (number not stated) showed hematopoietic foci in the liver suggesting chronic anemia. One of the animals with multiple hepatic myelolipoma was a male Siberian tiger and the others were 4 male and 2 female cheetahs; all were adults; 2 had been in captivity (4-14 yr.) on standard zoo diets (horsemeat, liver, heart, cod liver oil; rabbits were fed to the cheetahs) since the age of 1-2 yr., and had been vaccinated twice against infectious feline enteritis. Examination of pathological specimens from 25,695 other zoo animals (22,153 mammals, 3172 birds, 341 reptiles 29 amphibians; 3396 specimens from the Chicago zoo and 22,299 from AFIP) showed no myelolipomas, although 1 old grizzly bear showed a subcapsular splenic myelolipomatous focus. Associated tumors in the animals with hepatic myelolipoma included a hepatoma and several hepatic lipomas in 1 cheetah and splenic myelolipomas in 4/7. The liver myelolipomas resembled the adrenal myelolipoma of man. It is suggested that myelolipomas are metaplasia (not neoplasia), developing from extramedullary hematopoietic foci under the influence of such stimuli as chronic anemia or hormonal imbalance.

69-410 FREQUENCY OF MALIGNANT TUMORS IN CHILDHOOD AND ADOLESCENCE IN OTOLARYNGOLOGY. (Ger.) Schöder, H. J. (Humboldt, U., Berlin), J. Kressin, K. R. Ziehe and H. Krüger. Radiobiol. Radiother. (Berlin) 9(3):239-246, 1968.

Examination of statistics on mortality data revealed that neoplasms among children and adolescents accounted for 2% of yearly cancer deaths in East and West Germany (1960-1964). Since neoplasms of the ear, nose and throat (ENT) were not recorded as a separate entity until 1964 and morbidity data seem inadequate and incomplete, the publishing of data from large hospitals seemed called for. The ENT cancer mortality rate is 103/1,000,000 inhabitants/yr.; about 1.869% of all tumors are in the ENT area. Analysis of records from 1950-1966 at the Ear Nose and Throat Clinic and Tumor Clinic (Humboldt University, Berlin) revealed 113 cases of ENT neoplasms (50 carcinomas, 63 sarcomas) among children, adolescents and young adults (0-30 yr.). Noticeable was a greater prevalence among males (82/113) and an increased frequency among older pts. (34/113 were under 15, 54/113 age 21-30).

69-411 STUDIES ON THE ASSOCIATION OF CARCINOMA AND BLOOD GROUP FACTORS. (Ger.)

Scholz, W. (U. of Düsseldorf, Germany). Humangenetik 6(1):88-89, 1968.

The distribution of blood groups (ABO, Rh, MN, P, Gm, haptoglobins) was studied in 600 pts. with cancer (353 female genital, 66 breast, 71 bronchus, 110 other forms) and a varying number of normal subjects (usually about 1000). Of all the blood factors studied only the P factors showed any statistically significant correlation with cancer; specifically, between the P factors and bronchial carcinoma. The normal distribution in controls was 77.8% P+ and 22.2% P-; the distribution in pts. with bronchial cancer was 64.8% P+ and 35.2% P-. This difference was statistically significant at the 2% level.

69-412 RECTAL BLEEDING WITH SPECIAL REFERENCE TO CANCER OF THE LARGE INTESTINE. (E.)

Aylett, S. O. (Gordon Hosp., London). Brit. Med. J. 3(5610):103-106, 1968.

The 1965-66 data from the Registrar General showed 5461 deaths from rectal cancer and 9152 from colon cancer; over 60% of the colon tumors were of the pelvic or low descending areas. In 200 consecutive cases of colon and rectum cancer (100 with each disease), the av. delay in diagnosis from "pt. factors" (78/100 of each group) was 7 and 10.3 mo., resp., while the av. "medical delay" (22/100 of each group; 67% and 25%, resp., at the hospital level) was 7.8 and 10.3 mo., resp. These delays in diagnosis, usually resulting from inaccurate diagnosis of rectal bleeding resulted in a significant increase in the number of pts. with advanced disease at the time of correct diagnosis. The differential diagnosis of rectal bleeding (reported by about 14,000 pts. each yr.) is discussed.

69-413 RATES, INTERVIEW, AND PATHOLOGY STUDY OF CANCER OF THE URINARY BLADDER IN NEW ORLEANS, LOUISIANA. (E.)

Dunham, L. J. (NCI, Bethesda, Md.), A. S. Rabson, H. L. Stewart, A. S. Frank and J. L. Young, Jr. J. Nat. Cancer Inst. 41(3):683-709, 1968.

From 1958-64, 702 new cases of presumptive or confirmed primary bladder cancer were identified and 631 were histologically confirmed as transitional cell (92%), squamous cell (4.3%), undifferentiated (1.7%) carcinoma, adenocarcinoma (1.1%), sarcoma (0.6%) and unclassified types (0.3%). New Orleans residents (St. Bernard, Orleans and Jefferson parishes; 564 pts.) were selected for the incidence study. Of the 631 pts., 337 were white males, 78 Negro males, 167 white females and 49 Negro females; age-adjusted incidence rates/100,000/yr. were 19.0, 11.2, 7.4 and 7.2, resp. (total 11.4). Transitional cell carcinoma was less frequent in the Negro pts. (88.5% in males, 67.5% in females) but squamous cell carcinoma was higher (7.6% and 18.3%, resp.); adenocarcinoma and undifferentiated carcinoma were higher in Negro females (each 6.1%), than in white pts. The incidence rates varied from 1 yr. to another; the total incidence was about 30% lower than the 21.2/100,000 reported for New Orleans in 1947. Excessive occupational risks in white males included sailors and deckhands, tinsmiths and coppersmiths, machinists, civil engineers, plumbers, structural metal workers, barbers and carpenters. A significant correlation between tobacco use (all forms combined) and bladder cancer was seen in males only.

69-414 CYSTOSARCOMA PHYLLODES OF THE BREAST: A STATISTICAL STUDY OF FORTY CASES.

(E.) Minami, A. (Kyoto U. Hosp., Japan) and K. Masuda. Nippon Geka Hokan (Arch. Jap. Chir.). 37(4):571-580, 1968.

Of 2837 pts. with breast diseases (including 138 males with gynecomastia) seen at the authors' clinic in 1958-1967, 40 (1.4%) had cystosarcoma phyllodes and 361 (12.7%) had fibroadenoma, compared to 576 (20.3%) with cancer and 1123 (39.6%) with mastopathy. The age range in pts. with cystosarcoma phyllodes was 13-49 yr. (12/40 were under 19), compared to 13-56 yr. (43 or 11.9% under 19) in pts. with fibroadenoma; av. ages were 26 and 29 yr., resp. Of these pts., 26/40 (65%) and 157/361 (43.5%), resp., were single, but the high incidence of cystosarcoma phyllodes in single women was attributed to the low av. age. Only 11/40 with cytosarcoma phyllodes had ever been pregnant and only 2/11 had more than 2 children (3 or 6 children). The cystosarcoma phyllodes was described at operation as histologically benign in 31/40 and borderline in 8/40 (1/40 refused surgery). It is suggested that cystosarcoma phyllodes develops from fibroadenoma.

See also abstract nos.: 218,228,229,230,249,250

69-415 CARCINOMA IN A RECONSTRUCTED ESOPHAGUS. (E.) Bromberg, B. E. (State U. New York, Downstate Medical Ctr., Brooklyn, N. Y.), I. C. Song, A. Mishrick and R. Collins. Ann. Surg. 168(2):269-273, 1968.

A 47-yr.-old man with a 3-4-yr. history of chronic peptic ulcer developed esophageal stenosis 3 mo. after surgical closure of pyloric perforation. The clinical diagnosis was esophageal carcinoma with obstruction by granulomatous tissue; X-rays were therefore admin. for 9 days (doses not stated, but described as low), but later esophageal resection showed a chronic esophageal ulcer with lymphadenitis and anthracosis, without signs of malignancy. A prethoracic skin tube esophagostoma was constructed 14 mo. later; before and after this time, a removable rubber tube was used to join the esophagostoma and a gastrostomy. Normal nutrition was maintained for the next 21 yr.; the pt. was then readmitted with recurrent esophageal stenosis. Endoscopy showed an ulcerating lesion about 6" above the distal opening of the skin tube; biopsy disclosed a well-differentiated skin carcinoma. The tumor area was resected and the skin tube reconstructed. The pt. remained in good condition for the next 8 yr., then died of heart disease (aged 77); autopsy showed no signs of cancer. In the 3 other such cases reported in the literature, cancer developed at the site of anastomosis and its origin (the esophagus or the skin tube) could not be determined. This pt. also differed from the other 3 cases in having received radiotherapy, although no cause-effect relationship could be determined.

69-416 A SPECIFIC COMMON CHROMOSOMAL PATHWAY FOR THE ORIGIN OF HUMAN MALIGNANCY. (E.) Gofman, J. W. (Lawrence Radiation Lab., U. California, Livermore), J. L. Minkler and R. K. Tandy. Lawrence Radiation Lab. UCRL-50356:1-77, 1967.

To test the Boveri hypothesis that chromosomal imbalance of any origin leads to malignancy, a method of chromosome scanning was developed and tested in several human cell types: 3 tumor cell clones, HeLa (cervix carcinoma), RPMI-2650 (effusion cells from anaplastic nasal septum carcinoma) and HEp-2 (epidermoid laryngeal carcinoma); 4 normal clones, Chang (liver), FL and WISH (amnion) and Detroit-98 (bone marrow); and fresh cells from 2 untreated male pts. with malignant effusions from carcinoma of the lung or stomach. Computer analysis of the data showed 1 invariant factor, a marked absolute or relative excess of E-16 chromosomes (independent of the number of chromosomes), in all of these cell types. The ratios of E-16 to groups B, (G + Y) and (C + X) were significant for all cell types. A definite but less marked invariant elevation of the E-17 chromosomes was noted in all established clones and 1/2 fresh tumor cell preparations. Normal human diploid cells (embryonic male lung or skin + muscle, female fetal lung, normal male blood cells), not adapted to long-term cultivation, were used as controls. It is suggested that this specific chromosome abnormality represents a common pathway both for the development of malignancy and for unlimited growth of normal human diploid cells in vitro. The possibility that the loss of proliferative capacity coincides with the development of E-16 deficiency is discussed. Although no preparations of leukemic cells were examined, the authors maintain that the Ph^1 chromosome of chronic myeloid leukemia also represents an E-16 excess.

69-417 SEX CHROMATIN STUDIES IN WOMEN WITH LUNG CANCER. (Ger.) Baradnay, G. (U. Szeged, Hungary), Z. Monus and F. Kulka. Zbl. Allg. Path. 111(3):275-277, 1968.

Sex chromatin morphology was studied in biopsy or autopsy specimens from 37 women with lung cancer. The percentage of Barr-positive cells varied from 30-100%; cancer tissue in 20/37 had 90-100% Barr-positive cells, in 13 cases 50-89% and in 4 cases 30-49%. No female lung cancer tissue examined showed a complete lack of female sex chromatin.

69-418 CHROMOSOME INVESTIGATIONS IN THE DIAGNOSIS OF ACUTE LEUKEMIA. (Dan.) Jensen, M. K. (City Hosp. Copenhagen) Ugeskr. Laeg. 130(34):1388-1390, 1968.

Cytogenetic studies of the bone marrow of 34 pts. with acute leukemia showed abnormal stem lines in the bone marrow in 13/34; 3/13 (adults) were chosen for a more detailed report on chromosomal deviations. One pt. (erythroleukemia) showed a stem line of 47 chromosomes with an extra chromosome in group 6-12 and no Ph^1 chromosome; 1/3 (myelofibrosis and myeloid leukemia) had a stemline of 42 chromosomes including 1 ring chromosome. The third pt. (chronic myeloid leukemia) had a chromosome complement of 44; 80% of the metaphases showed a small acrocentric or metacentric chromosome, not resembling a Ph^1 chromosome. It is concluded that a normal chromosome complement in the bone marrow does not exclude the diagnosis of acute leukemia.

69-419 DNA UPTAKE BY A MUTANT STRAIN OF LYMPHOMA CELLS. (E.) Ayad, S. R. (U. Manchester, England) and M. Fox. Nature (London) 220(5162):35-38, 1968.

A mutant line (P388F/120) of the P388F mouse lymphoma, resistant to 5-iodo-2'-deoxyuridine (IUdR) and with a reduced capacity to incorporate ^{3}H-thymidine and ^{3}H-IUdR, was isolated and used as the recipient in studies of uptake and integration of homologous DNA isolated from P388F cells. Donor DNA labeled with ^{3}H was taken up linearly by recipient cells. A distinct peak of integrated DNA was demonstrated, suggesting uptake and integration of DNA in its macromolecular form. The extent of integration of donor DNA was 1.5% of the recipient genome.

9-420 CYTOPLASM-NUCLEAR RATIO OF DEGREES OF MALIGNANCY IN THE CERVIX EPITHELIUM, MEASURED WITH THE ZEISS INTEGRATION OCULAR. I IN CARCINOMA *IN SITU* AND MICROCARCINOMA OF THE CERVIX. (Ger.) Hillemanns, H. G. (U. Freiburg i. Breisgau, Germany), B. Sixtus-Klug and E. Prestel. *Arch. Gynaek.* 206(1):82-97, 1968.

The cytoplasm/nucleus (C/N) vol. ratio was examined in 1200 conization specimens from 153 women in the beginning (pre-stage) and first growth (early stages) of cervix carcinoma. Individual stages of cancer formation (Group A) and the degree of malignancy of different stages of microcarcinoma in the same pt. (Group B) were also measured. Nuclear vol. gradually increased from the normal squamous epithelial stage (9.2%) to max. levels (27%) in carcinoma *in situ*, together with a max. of growth activity and a minimum of differentiation. During the invasive stage the C/N ratio increased again, representing an increase in the amount of cytoplasm. The imminent invasive stage, heralded by an increase of the C/N ratio, was characterized by intraepithelial redifferentiation (i.e. eosinophile maturation foci) during the transitional stage. The renewed but incomplete redifferentiation was readily identified and easily measured at the start of stromal invasion. The integration ocular microscope (Zeiss) was used and the results compared with those obtained by classical karyometry. In spite of greater inaccuracy in some cases, this method was considerably more reliable in a large, statistically significant number of cases and was highly recommended.

9-421 THE OCCURRENCE AND METABOLISM OF ALKYL AND ALK-1-ENYL ETHERS OF GLYCEROL IN TRANSPLANTABLE RAT AND MOUSE TUMORS. (E.) Snyder, F. (Oak Ridge Assoc. U., Tenn.) and R. Wood. *Cancer Res.* 28(5):972-978, 1968.

The neutral lipid (NL) and phospholipid (PL) fractions of 2 rat tumors (Walker 256 carcinosarcoma, R-3259/96A sarcoma) and 11 mouse tumors (Sarcoma 180, T241 sarcoma, B-16 melanoma, E0771 adenocarcinoma, Taper liver tumor, Friend virus leukemia, Ehrlich ascites carcinoma [EAC], C1025 carcinoma, KHZ mammary tumor, Ridgway osteogenic sarcoma, Mecca lymphosarcoma) were analyzed. The conc. of glyceryl ethers in the NL fraction and of ether-linked PL in the tumors were higher than in most normal cells. In mice with EAC admin. ^{14}C-labeled fatty acids (i.p.), label from palmitic acid was incorporated into both the ether-linked aliphatic moiety (13-25% of total glyceryl ether diester activity) and the esterified fatty acids of glyceryl ether diesters. The glyceryl ether diesters were also labeled by ^{14}C from fatty alcohols and triglycerides, but not by label from C^{14}-labeled acetate or glucose or ^3H_2O. In EAC-bearing mice admin. ^{14}C-labeled palmitic acid, the specific activities of the triglyceride fraction were higher than those of the glyceryl ether diesters of the tumor cells. The specific activities of the alk-1-enyl ethers were higher than those of the alkyl ethers in the NL fraction, but they were about equal in the PL fraction.

69-422 DETECTION OF ANTIGENS OF A NEW DIETHYLNITROSAMINE-INDUCED TRANSPLANTABLE HEPATOMA BY DELAYED HYPERSENSITIVITY. (E.) Churchill, W. H., Jr. (NCI, Bethesda, Md.), H. J. Rapp, B. S. Kronman and T. Borsos. *J. Nat. Cancer Inst.* 41(1):13-29, 1968.

Sewall Wright Strain 2 male guinea pigs immunized intradermally with living cells from an autologous transplanted diethylnitrosamine-induced hepatoma developed a skin reaction with the characteristic clinical, histological and other features of delayed hypersensitivity. Tumor cells admin. to induce the skin reactions grew into intradermal papules, which regressed more rapidly in the immunized animals than in untreated controls. The size of these papules was not affected by immunization with normal liver or spleen cells, or by inj. of cells from a methylcholanthrene-induced liposarcoma of Strain 2 guinea pigs, although the liposarcoma was also antigenic. Antigens from the hepatoma, detected by cellular hypersensitivity and transplantation tests, may be tumor antigens, but they may also represent genetic drift of the host or the tumor.

69-423 ANTIGENICITY OF A NEW DIETHYLNITROSAMINE-INDUCED TRANSPLANTABLE GUINEA PIG HEPATOMA: PATHOLOGY AND FORMATION OF ASCITES VARIANT. (E.) Rapp, H. J. (NCI, Bethesda, Md.), W. H. Churchill, Jr., B. S. Kronman, R. T. Rolley, W. G. Hammond and T. Borsos. *J. Nat Cancer Inst.* 41(1):1-11, 1968.

A hepatoma induced in a male Sewall Wright Strain 2 guinea pig by diethylnitrosamine (42 mg/liter in drinking water, 6 days/wk.) was transplanted serially for 3 yr. in guinea pigs of the same strain without changes in morphology (adenocarcinoma). Tumor growth was slow and unreliable after s.c. inoc.; reliable tumor growth was obtained after i.m. inoc., the latent period depending on the initial cell inoculum. Ascites tumors were obtained by i.p. inoc. of cells from the i.m. tumors. In Strain 13 guinea pigs inoc. with the hepatoma, tumor growth was seen in 4/5 (compared to 6/6 Strain 2 recipients); after 146 days, all Strain 2 animals had died of widespread metastases, but 4/5 Strain 13 recipients were alive and 1/4 had no palpable tumor at the inoc.

site. The tumor cells induced immunity to a subsequent challenge after i.m. inj. (at all doses from 4×10^3-5×10^5 cells from an i.m. tumor) or intradermal inj. (5.4×10^6 cells in 3 doses over 16 days, from an ascites tumor). Both intradermal and i.m. immunization protected the animals from i.m. or intradermally inoc. tumors. The slower growth rate of this tumor in Strain 13 guinea pigs (by comparison to the Strain 2 animals) was attributed to immunogenicity of the tumor in Strain 2, although animals of the 2 strains do not reject skin grafts from the other strain.

69-424 CONGENITAL DEVIATIONS OF KARYOTYPE IN PATIENTS WITH ACUTE LEUKEMIA. (Rus.) Prigozhina, E. L. (Inst. Exp. Clin. Oncol. U.S.S.R. Acad. Med. Sci., Moscow), A. A. Stavrovskaia, A. F. Zakharov, G. P. Lelikova and N. V. Streliukhina. Vop. Onkol. 14(6):58-64, 1968.

Chromosomal study of bone marrow of 18 pts. with acute leukemia and 1 pt. with generalized reticulum cell sarcoma in partial remission showed prezygotic anomalies of the karyotype in 2 men with leukemia (D/D translocation and the Y chromosome, resp.); the karyotype was normal in 9/16 of the other leukemia pts., diploid and tetraploid type (12-14% of cells) in 3/16, peritetraploid (83%) in 1/16 and hyperdiploid in 2/16. In the pt. with generalized reticulum cell sarcoma, the prevalent karyotype was pseudodiploid with 2 large acrocentric and submetacentric marker chromosomes of group A. The possible role of congenital chromosomal anomalies in the etiology of leukemia is discussed.

69-425 SELECTIVE TUMOR RECEPTIVITY OF THE LUNG OF NEWBORN MICE. (E.) Tokuzen, R. (Nat. Cancer Ctr. Res. Inst., Tokyo), W. Nakahara and T. Mita. Cancer Res. 28(5):999-1002, 1968.

In Swiss mice inj. i.p. with sonicates of Sarcoma 180 or NTF sarcoma (0.05 ml) at age 0-18 days, the ascites tumor incidence (53.5-100% and 44.5-63.1%, resp.) showed no significant increase or decrease with age, but the incidence of lung metastases decreased markedly from 54.5 and 62.7%, resp., at age 0-2 days, to 8.6-8.7% at age 6-8 days; no lung metastases were seen in either group after tumor sonicate inoc. at age 8-16 days. A similar decreasing incidence of lung metastases (76.5% and 82.7%, resp., at age 0-2 and 2-4 days, decreasing to 2.9% at age 12-14 days) was seen in mice inj. i.p. with intact Sarcoma 180 cells. The factor(s) determining the selectivity of the lung to tumor cells in the neonatal period could not be determined; studies of the marked biochemical and physiological changes occurring in the lung immediately after birth are recommended.

69-426 THE ESTABLISHMENT OF A CELL LINE OF HUMAN HORMONE-SYNTHESIZING TROPHOBLASTIC CELLS IN VITRO. (E.) Pattillo, R. A. (Johns Hopkins Med. Insts., Baltimore, Md.) and G. O. Gey. Cancer Res. 28(7):1231-1236, 1968.

Primary explants of choriocarcinoma cells were successful for fresh surgical and autopsy specimens from 3/7 women; 2/3 explants were maintained for 4 mo. in vitro, but the tumor cell colonies were later lost by collagen lysis and retraction. A stable clone (designated BeWo) was obtained by parabiotic cultivation (with normal human decidual tissue) of a single-cell colony derived from a human choriocarcinoma (cerebral metastasis) maintained by serial cheek pouch transplantation in hamsters for 304 generations. The BeWo line grew rapidly for the first 2 wk. in 70% Waymouth's MB 752/1 + 30% cord serum medium; later cultures were maintained on 50% Waymouth's MB 752/1 + 10% cord serum + 40% Gey's balanced salt soln. The clone was also adapted to newborn calf serum. The BeWo cells were maintained in vitro for 1.5 yr. without alterations in karyotype (mode of 86 chromosomes) or the very high level of chorionic gonadotropin synthesis (about 10^{-5} I.U./cell in 24 hr.).

69-427 CELLULAR LOCATION OF CARCINOEMBRYONIC ANTIGENS OF THE HUMAN DIGESTIVE SYSTEM. (E.) Gold, P. (McGill U. Med. Clinic, Montreal, Canada), M. Gold and S. O. Freedman. Cancer Res. 28(7):1331-1334, 1968.

The carcinoembryonic antigens (CEA; antigens found in adenocarcinomas of the g.i. tract and in embryonic and fetal intestine, pancreas and liver in the first 6 mo. of gestation) were studied. Anti-CEA antibody levels were studied in sera from 212 subjects (normal controls and pts. with various diseases). These antibodies were noted in sera from women in all trimesters of pregnancy and in 70% of an unspecified number of pts. with non-metastatic g.i. cancer. No apparent relationship was noted between anti-CEA titers and the stage of the disease, although the antibodies were absent when metastases were present and disappeared from the sera of 4 operated pts. Fluorescent antibody studies of several surgical specimens demonstrated specific localization of the anti-CEA antibodies on the plasma membranes of the tumor cells; the adjacent normal cells were negative. All serum anti-CEA antibodies were inhibited by 2-mercaptopropanol, suggesting that they are macroglobulins, not 7S antibodies. Either the antibodies were formed in insufficient quantities to affect the tumor, or they were not cytolytic (in which case they may play a role in enhancing tumor growth).

69-428 CHROMOSOMES OF THE WALKER 256 MAMMARY CARCINOMA: OBSERVATIONS ON PRIMARY AND METASTATIC TUMORS OF A NEW SUBLINE WITH A PSEUDODIPLOID KARYOTYPE. (E.) Nicholson, S. F. (U. Alberta, Edmonton, Canada), O. G. Thurston and P. Bowen. J. Nat. Cancer Inst. 41(1):217-227, 1968.

ne WM-10 and WM-13 lines of Walker 256 mammary arcinoma, maintained by serial i.m. transplanta-ion in Sprague-Dawley rats, were examined after hromosome separation by *in vivo* colchicine admin. rimary and metastatic tumors both showed a seudodiploid chromosome number (36-42, with ajor and minor modes at 42 and 41, resp.); 4-5% F the cells were polyploid. Group I regularly ontained 4 chromosomes; 2 resembled the #1 pair the normal rat karyotype (although they may X chromosomes with subterminal centromeres), /4 was a long subtelocentric and 1/4 was a large etacentric, not resembling any chromosomes in ne normal karyotype. The normal #2 (telocentric) d #3 (satellited) pairs were not identified. roup II contained 15-19 (usually 17-18) telo-ntric chromosomes, with an unpaired, small rker. The Group III chromosomes often resembled ne normal rat karyotype, but over 50% of the tumor ells contained an additional subtelocentric romosome. The Group IV chromosomes (10-15) cluded 1 large unpaired marker; Group V (3-5, ually 4 chromosomes) included 1 characteristic rker. This karyotype remained constant through-t the 2-mo. study.

9-429 MORPHOLOGICAL EXAMINATIONS OF NUCLEI IN CARCINOMAS OF FEMALE GENITAL ORGANS.

Ger.) Trebbin, H. (North City Hosp., Hannover, ermany) and P. Hofmann. *Med. Klin.* 63(30):1180-183, 1968.

clear Barr's bodies were demonstrated in 382/1130 ecimens of female genital tumors (24/36 carci-mas of the vulva and vagina, 11/89 carcinomas *situ*, 75/186 keratinizing squamous cell car-nomas, 104/496 non-keratinizing squamous cell rcinomas and 5/12 adenocarcinomas of the cervix; 2/207 corpus uteri adenocarcinomas; 4/10 adeno-anthomas, 11/14 solid and 46/80 adenomatous car-nomas of the ovary). Barr's bodies were present 34% of the cells of carcinomas of the vulva d vagina, 36% of the cells of carcinoma *in tu*, 29% of keratinizing squamous cell carcinomas d 37% of non-keratinizing squamous cell carci-mas. No significant differences were found ong different tumors with respect to the pro-rtion of Barr-positive cells (62% of squamous ll carcinomas and 72% of adenocarcinomas con-ined Barr's bodies in over 10% of nuclei; none re found in 7.5% of squamous cell carcinomas, 7% of adenocarcinomas of the uterus and 4.9% carcinomas of the ovary). The incidence of rr's bodies did not seem to be age-related. out 67% of all tumor cells were Barr-positive.

-430 RENAL ANGIOMYOLIPOMA: A CLINICOPATHOLOGIC STUDY OF 32 CASES.

(E.) Farrow, M. (Mayo Clinic, Rochester, Minn.), E. G. rrison, Jr., D. C. Utz and D. R. Jones. *Cancer* (3):564-570, 1968.

ta from 32 cases (9 autopsy, 23 surgical) of giomyolipoma (hamartoma) of the kidney seen er 50 yr. at the Mayo Clinic are reported. e age range in the operated pts. was 26-72 yr. (av. 41); the autopsy pts. included 3 children (6-13 yr.) and 6 adults (av. age 42 yr., max. 80). The male:female ratio was 9:23. The tumors were solitary in 22/32, multiple unilateral in 5/32, and solitary or multiple bilateral in 2/32 and 3/32, resp. The disease course was very slow; 13 pts. survived 8-39 yr. after diagnosis. No distant metastases were seen and kidney function was well preserved for long periods of time, even in pts. with bilateral tumors. The association of renal angiomyolipoma with tuberous sclerosis (TS) was noted or suspected in 12 pts. All signs of the disease were present in 3/32 (all children), 7 pts. showed multiple cutaneous hamartomas alone (4) or associated with epilepsy and slight mental retardation (1) or intracerebral calcification (2). Two women showed no signs of TS themselves, but each had 1 child with severe central nervous system disease believed to be TS. The number and distribution of the kidney tumors was correlated to the extent of signs of TS; 3/3 with multiple bilateral tumors had severe TS and 3/5 with multiple unilateral tumors had less severe signs of TS.

69-431 THE UPTAKE OF (6,7-^{3}H)-OESTRADIOL BY OESTROGEN DEPENDENT AND INDEPENDENT HAMSTER KIDNEY TUMOURS.

(E.) Steggles, A. W. (Imperial Cancer Res. Fund, London) and R. J. B. King. *Europ. J. Cancer* 4(4):395-401, 1968.

Uptake of ^{3}H-estradiol (E; 1.0 μg/100 g s.c.) was studied in male hamsters bearing an estrogen-induced kidney tumor, which lost its estrogen sensitivity after several s.c. transplant generations, or the RCA-1 renal adenocarcinoma (estrogen-independent). The animals were implanted s.c. with pellets of E (15 mg) or diethylstilbestrol (DES; 15 mg; most studies) at 3-mo. intervals. E uptake was studied in most animals with pellets *in situ* or 48 hr. after removal of the pellets; 1 group was implanted with DES 19 days before tumor inoc. Label distribution was studied 30 min. or 4 hr. after ^{3}H-E admin. In both the estrogen-dependent and estrogen-independent tumors, free E was the major steroid recovered after 30 min.; at 4 hr., most label was seen in the conjugated fractions. Several metabolites were detected in liver and kidney at both times. The primary estrogen-dependent tumor took up about 10-fold more label than the transplanted estrogen-independent tumors, irrespective of tumor site (s.c. or under the kidney capsule); label uptake in the RCA-1 (estrogen-unresponsive) tumor was lower than in the estrogen-independent tumor. Neither the estrogen-dependent nor the estrogen-independent tumor took up ^{3}H-E *in vitro*. *In vivo* uptake was about the same in estrogen-dependent or -independent tumors in animals with or without estrogen implants, but label uptake in estrogen-dependent tumors was significantly higher in animals admin. E than in those admin. DES. It is suggested that the significant difference in E uptake between estrogen-dependent or -independent tumors at 30 min. was related to changes in either the nature of the estrogen-receptor complexes or the number of estrogen receptor sites in the tumor.

in either the nature of the estrogen-receptor complexes or the number of estrogen receptor sites in the tumor.

69-432 POLYPLOIDY IN HUMAN MALIGNANCY. HYPOPENTAPLOID CHROMOSOME PATTERN IN MALIGNANT RETICULOSIS WITH SECONDARY SIDERACHRESTIC ANEMIA. (E.) Bauke, J. (U. Ulm, Germany) and K. Schöffling. Cancer 22(3):686-694, 1968.

A 73-yr.-old man with a 13-yr. history of lymphoreticular disease (chronic myeloid leukemia had been diagnosed 3 yr. previously) was admitted with malignant reticulosis and secondary siderochrestic anemia. The peripheral WBC was pancytopenic and remained unchanged until the pt. died (4 mo. after admission); the bone marrow showed a progressive increase in blasts (to 87-91%), suggesting myeloid metaplasia with acute leukemic transformation. Chromosome morphology was studied in 208 peripheral WBC and 403 bone marrow cells on 8 occasions during hospitalization; the range of ploidy was determined in 995 metaphase cells and 107 cells were karyotyped (21/107 were polyploid). Nearly all peripheral WBC were normal diploid (1.5% were near-tetraploid). The bone marrow cells showed predominantly tetraploid, hypertetraploid and (in the terminal stages) hypopentaploid karyotypes. All cells were Ph^1-negative, without partial deletions or pericentric inversions of chromosomes 19-20. Numerous satellite associations of the DDGGG or sometimes DDDG type were seen. Examination of 8 cells with 47 chromosomes showed 1 cell with F trisomy and 1 with A trisomy. No signs of endoreduplication were seen in cells with 92 chromosomes (tetraploid); no patterns of chromosome loss were noted in the hypotetraploid cells. The hypertetraploid and hypopentaploid cells showed supernumerary chromosomes in groups C through G, including 2 markers (medium metacentric and small acrocentric) were present, suggesting a stemline of 104-106 chromosomes (hypopentaploid). Minor diploid, tetraploid and polyploid lines were also present and a few cells were octoploid. The increase in hypertetraploid, hypopentaploid and polyploid cells in the terminal stages suggested clonal evolution as the disease progressed.

69-433 CHROMOSOMAL CHANGES OF IMMUNOGLOBULIN-PRODUCING CELL LINES FROM HUMAN LYMPH NODES WITH AND WITHOUT LYMPHOMA. (E.) Saksela, E. (U. Helsinki, Finland) and J. Pontén. J. Nat. Cancer Inst. 41(2):359-372, 1968.

Chromosome morphology was studied in 4 established lymphoblastoid clone lines, 2 involved with Hodgkin's disease (61 M and 129 M) and 2 of histologically uninvolved lymph nodes from pts. with colon cancer (111 C) or breast cancer (115 C). The characteristic abnormality was a 47-chromosome mode with a single trisomy and markers of obvious origin, but karyotypes varied from 1 line to another. In 61 M, almost all cells were of the abnormal clone (possible A-3 trisomy); in 129 M, almost all cells were normal and signs of an abortive clone were present (possibly a result of chemotherapy). In 111 C, a trisomy-group C clone was replaced by a line with a large marker resulting from rearrangement of an #A-1 homolog. In 115 C, a clone with a minor group E abnormality was replaced by a clone showing group D rearrangement. The production of IgG immunoglobulin by all cells was qualitatively and quantitatively constant throughout the cultivation period (1.5 yr. for 61 M, 11 mo. for the others); it is concluded that the immunoglobulin-controlling portions of the genome were not involved in the chromosomal changes observed.

69-434 ULTRASTRUCTURE OF EWING'S SARCOMA OF BONE. (E.) Friedman, B. (Case Western Res. U., Cleveland, Ohio) and H. Gold. Cancer 22(2):307-322, 1968.

Light and electron microscopic examination of biopsy material from 2 girls (9 or 15 yr. old) with Ewing's sarcoma (humerus or fisula) revealed that the principal tumor cell is 9-15 microns in diameter and irregular in shape, with a monolayer membrane, clear cytoplasm with a moderate number of ribosomes and mitochondria which were often degenerated. Most cells contained endoplasmic reticulum and elements of Golgi apparatus. Glycogen granules were seen in the cytoplasm of osmium-fixed cells. The nucleus was single, large, oval and often indented, containing a prominent nucleolus. Specimens from both tumors contained cells differing from the principal Ewing sarcoma cells and resembling reticulum cells, comprising about 25% of the cell population. The cytoplasm contained large numbers of ribosomes; the nuclei of these cells were denser than in the principal tumor cells and varied from oval to triangular with dense chromatin masses. Cells apparently representing gradations from the typical clear Ewing sarcoma cells to the more mature electron-dense cells were also seen. They pointed towards a transition from stem cells to mature reticulum cells and suggested that Ewing's sarcoma evolves from immature reticulum cells.

69-435 TESTOSTERONE, PROSTATE GLAND AND HORMONE ACTION. (E.) Baulieu, E. E. (Hormones Lab., 94-Bicetre, France), I. Lasnitzki and P. Robel. Biochem. Biophys. Res. Commun. 32(3):575-577, 1968.

69-436 THE BEHAVIOUR IN AKR MICE OF LYMPHOMA SUBLINES OF LOW AND HIGH MALIGNANCY. (E.) Lowery, R. S. (University of Birmingham, England), A. E. Williams and H. Smith. Brit. J. Cancer 22(2):377-381, 1968.

9-437 THE BEHAVIOUR IN RATS OF TUMOUR SUBLINES OF LOW AND HIGH MALIGNANCY. E.) Williams, A. E. (University of Birmingham, ngland), R. S. Lowery and H. Smith. *Brit. J. ancer* 22(2):367-376, 1968.

9-438 THE DERIVATION OF SUBLINES OF LOW AND HIGH MALIGNANCY FROM RAT AND MOUSE UMOURS. (E.) Smith, H. (University of rmingham, England), A. E. Williams, R. S. wery and J. Keppie. *Brit. J. Cancer* 22(2): 59-366, 1968.

-439 THE ENTRANCE OF EXOGENOUS RNA INTO THE MOUSE ASCITES CELL. (E.) Niu, M. C. (Temple U., Philadelphia, Pa.), L. C. Niu and A. Guha. *Proc. Soc. Exp. Biol. Med.* 128(2): 550-555, 1968.

69-440 DEMONSTRATION OF RIBONUCLEIC ACID 10-12 S IN THE CYTOPLASM OF KB TUMOR CELLS. (Fr.) Louisot, P. (Res. Ctr., Lyon, France), A. Ray and G. Morat. *C. R. Soc. Biol.* 162(1):128-131, 1968.

69-441 BILATERAL WILMS' TUMOR. (Rus.) Durnov, L. A. (Inst. Exper. Clin. Oncol., Moscow). *Urol. Nefrol. (Moskva)* 33(4): 66-68, 1968.

AUTHOR INDEX

ot, D. A. 244
kamatsu, Y. 300
kimov, A. A. 320
lexandrov, V. A. 288
lva, R. A. 393
nderson, G. R. 338
nderson, L. J. 406
nton, M. 258
rnesen, K. 231
rvin, J. M. 282
sadov, D. A. 318
shley, L. M. 296
tramadal, A. 225
vad, S. R. 419
vlett, S. O. 412

achmann, K. D. 386
ailar, J. C., III. 404
all, J. K. 291
nnasch, P. 275
radnay, G. 417
rmes, D. 397
roni, C. 278
rth, R. F. 360
tes, R. R. 277
ther, R. 374
uke, J. 432
ulieu, E. E. 435
zikian, K. A. 320
ard, J. W. 245
ierle, J. W. 359
rgamini, F. 337
rgs, V. V. 242
rnard, J. 405
rnhard, W. 251
rry, R. J. 269
rtoli, G. 278
uving, L. J. 310
ancifiori, C. 294
ernoth, G. 330
ggs, P. M. 364
iznakov, E. G. 380
bkov, A. G. 287
rek, C. 362
rneff, J. 323
rsos, T. 422,423
tkin, C. 321
wdon, B. J. 371
wen, P. 428
wles, C. A. 338
wles, N. D. 365
yse, E. A. 234,235
omberg, B. E. 415
ooks, R. E. 322,402
ucher, J. M. 280
ynjolffson, G. 409
rnett, J. P. 352

rter, R. L. 295
sey, A. E. 267
ang, R. S. 345
assin, L. N. 340
Chieco-Bianchi, L. 368
Chopra, H. C. 366
Christian, J. C. 264
Chubb, R. C. 364
Chuinard, R. G. 402
Churchill, W. H., Jr. 422,423
Ciocco, A. 263
Clemens, J. A. 283
Colafranceschi, M. 298
Colby, C. 379
Collins, R. 415
Conner, G. H. 338
Coppey, J. 370
Cosgrove, G. E., Jr. 241
Crocker, T. T. 268

Dalldorf, G. 337
Dalmasso, A. 391
Daoust, R. 261
Dausset, J. 220,405
Davies, J. N. P. 253
Davies, R. F. 313
Day, T. D. 313
Decristoforo, A. 396
De Harven, E. 240
Delachaux, A. 392
Delescluse, C. 357
De-Thé, G. 248
Devik, F. 222
Diehl, V. 342,344
Di Paolo, N. 389
Dirksen, E. R. 268
Dmochowski, L. 377
Doll, R. 227,228
Doolittle, D. P. 263
Dougherty, R. M. 247
Duflo, B. 395
Dulmadge, E. A. 371
Dunham, L. J. 404,413
Dupuy, J. M. 405
Durnov, L. A. 441
Durr, F. E. 366
Dvoirin, V. V. 218
Dzhioev, F. K. 318

Eisenbrand, J. 281
Elgjo, K. M. 223
Emrich, K. 281
Enomoto, M. 303

Fábián, B. 331
Fabisch, P. 361
Fabris, N. 278
Falcoff, E. 370
Falcoff, R. 370
Farrow, G. M. 430
Feingold, N. 405
Feinleib, M. 399
Feiring, E. H. 257
Feo, F. 250
Fiore-Donati, L. 368
Fischinger, P. J. 373
Fisher, B. 293
Fisher, E. R. 293
Foer, W. H. 257
Fogh, J. 346
Fontaine-Brouty-Boye, D. 370
Fortna, H. M. 409
Fox, M. 419
Frank, A. S. 413
Fredrickson, T. N. 246,363
Freedman, S. O. 427
Frei, J. V. 265
Friedman, B. 434
Fritzon, P. 224
Frost, P. 337
Fukuoka, F. 304
Furth, J. 237

Garner, F. M. 409
Geering, G. 234
Gerber, P. 339
Gey, G. O. 426
Gibel, W. 316
Gilden, R. V. 355
Glade, P. R. 340
Gofman, J. W. 416
Gold, H. 434
Gold, M. 427
Gold, P. 427
Goodall, C. M. 271
Gorrod, J. W. 295
Graffi, A. 333
Grases, P. 387,388
Greenblatt, M. 274
Gresser, I. 370
Grieshaber, E. 315
Grimmer, G. 329
Grinberg, K. H. 381
Griswold, D. P., Jr. 267
Gubareva, A. V. 254
Guha, A. 439

Hadley, H. G. 408
Hahn, E. C. 346
Hammond, W. G. 423
Hamre, D. 339
Harbers, E. 317
Harket, R. 400
Harrington, J. A. 352
Harrison, E. G., Jr. 430
Haupt, R. 385
Heberling, R. L. 355
Helgeland, K. 232
Hellström, I. 311
Hellström, K. E. 311
Helmboldt, C. F. 246
Henle, G. 342,344
Henle, W. 342,344
Higginson, J. 394
Hildebrandt, A. 329

Hilf, R. 276
Hillemanns, H. G. 420
Hinz, R. W. 338
Hiraki, K. 307
Hirshaut, Y. 340
Hoch-Ligeti, C. 282
Hofmann, P. 429
Horáček, J. 383
Huebner, R. J. 353,355
Hundeiker, M. 289,290

Ikegami, R. 300
Im, M. J. C. 272
Irino, S. 307
Ito, Y. 356,358
Iversen, O. H. 221,400

Jarrett, W. F. H. 406
Jensen, M. K. 418
Johnson, D. E. 270
Jones, D. R. 430
Judge, J. R. 367

Kasel, J. A. 340
Kelly, M. G. 321
Keppie, J. 438
Kern, J. 355
Khodosova, I. A. 284
Kimura, I. 358
King, R. J. B. 431
Klein, G. 236
Klinger, M. E. 407
Knorr, M. 324
Kobuna, I. 304
Kohn, G. 344
Kolesnichenko, T. S. 285
Konečný, L. 384
Koprowska, I. 297
Koss, L. G. 219
Kottaridis, S. D. 363
Kourilsky, F. M. 405
Kraus, P. 383
Kreyberg, L. 226
Kressin, J. 410
Kröll, W. 386
Kronman, B. S. 422,423
Krüger, H. 410
Kulka, F. 417
Kunte, H. 323
Kuroki, T. 273
Kutinova, L. 347
Kutscher, W. 327,328
Kutschera, H. 396
Kwon, S. H. 252

Langford, P. L. 377
Langvad, E. 332
Lasfargues, E. Y. 376,378
Lasfargues, J. C. 376
Lasnitzki, I. 435
Lederer, B. 317
Lefkowitz, S. S. 350
Lelikova, G. P. 424
Lennette, E. H. 354
Leonard, A. 374
Leong, J. L. 266
Lerner, L. J. 276
Lesobre, R. 395
Levij, I. S. 299
Liebelt, A. G. 377
Liebelt, R. A. 377
Lijinsky, W. 271
Linnik, A. B. 286
Lohs, K. 316
Lombard, L. S. 409
Louisot, P. 440
Lowery, R. S. 436,437,438
Luginbuhl, R. E. 363

Malmgren, R. A. 360
Marshak, R. R. 244
Martirosian, D. M. 381
Masuda, K. 414
Matsumoto, M. 306
Matsushima, T. 304
Maximos, A. 323
Mazurenko, N. P. 336
McArn, G. E. 402
McFarlane, E. S. 349
Meites, J. 283
Mellman, W. J. 344
Mendez, D. P. 387,388
Merekalova, Z. I. 336
Merkow, L. 348
Meschino, S. 389
Meyer, R. 253
Mihailovich, N. 259,260
Millar, J. D. 270
Miller, B. S. 402
Minami, A. 414
Minkler, J. L. 416
Minowada, J. 341
Mishrick, A. 415
Misiewicz, L. 398
Mita, T. 425
Mitchell, J. R. 338
Miyake, M. 303
Miyake, T. 358
Mobbs, B. G. 279
Modan, B. 403
Monus, Z. 417
Moon, R. C. 262
Moore, D. H. 376,378
Moore, G. E. 343
Morat, G. 440
Moriya, J. 307
Moses, H. L. 340
Moy, R. A. 339

Nakahara, W. 425
Napalkov, N. P. 288
Newman, W. C. 262
Nicholson, S. F. 428
Niu, L. C. 439
Niu, M. C. 439
Novak, J. R. 335
Novoa R., J. 387, 388

O'Connor, T. E. 372
Oettgen, H. F. 234
O'Gara, R. W. 321
Old, L. J. 234,235
Osato, T. 356
Otten, J. A. 365
Oury, M. 395
Ozer, H. 361

Page, M. A. 266
Pardo, M. 348
Park, H.-Y. 297
Pattillo, R. A. 426
Pawelski, S. 233
Pedersen, E. 229
Pedio, G. 315
Pennelli, N. 368
Petres, J. 289,290
Pierce, G. E. 311
Pillsbury, N. 376
Pindborg, J. J. 397
Poel, W. E. 263
Polliack, A. 299
Pollock, E. J. 255
Pontén, J. 433
Prehn, R. T. 217
Prestel, E. 420
Prigozhina, E. L. 424
Prunieras, M. 357
Pugh, J. R. 264
Purchase, H. G. 364

Rabson, A. S. 360,413
Rapp, H. J. 422,423
Ray, A. 440
Reddick, R. A. 350
Rees, E. D. 264
Reichert, J. K. 325,326
Reiskin, A. B. 269
Reuber, M. D. 305
Rhim, J. S. 353
Rhoades, J. W. 270
Rich, M. A. 238
Rickard, C. G. 243
Riggs, J. L. 354
Rijhsinghani, K. 274
Robel, P. 435
Roe, F. J. C. 295
Roed-Petersen, B. 397
Rolley, R. T. 423
Romano, E. 389
Rosenblum, E. N. 339
Rosenthal, A. S. 340
Rost, H. E. 330
Royston, I. 403
Rubin, H. 379
Rullière, R. 249
Rüttner, J. R. 315

Saksela, E. 433
Salazkin, M. A. 334

lzer, G. M. 396
nchez, M. 348
ndritter, W. 317
to, H. 273
to, K. 303
hacht, U. 275
hell, K. 353
henk, D. 324
hmähl, D. 308
höder, H. J. 410
hoental, R. 314
höffling, K. 432
holtz, W. 411
galoff, A. 276
lenka, F. 323
veri, L. 294
zaki, T. 307
aw, G. J. 349
ershulskaia, L. V. 369
evliagin, V. Y. 381
igeno, N. 235
igeta, S. 341
iratori, O. 356
ubik, P. 274
uck, A. E. 264
vemberger, I. N. 284
egler, R. 239
mard, A. 261
nskey, T. J. 345
xtys-Klug, B. 420
eřík, P. 384
ifkin, M. 348
ith, H. 436,437,438
yder, F. 421
loimskaia, E. A. 319
ng, I. C. 415

Spaar, U. 317
Stavrovskaia, A. A. 424
Steggles, A. W. 431
Stewart, H. L. 413
Stiop, L. D. 256
Stockert, E. 235
Streliukhina, N. V. 336,424
Stroobandt, G. 280
Stutzman, E. 282
Sugimura, T. 304
Sutherland, J. C. 401
Svenkerud, R. 230

Takata, H. 306
Takemoto, K. K. 360,361
Takeuchi, J. 292
Tandy, R. K. 416
Tank, R. 253
Terayama, H. 306
Thurston, O. G. 428
Thurston, P. 253
Ting, R. C. 375
Ting, R. C. Y. 361
Todaro, G. J. 255
Tokuzen, R. 425
Tomatis, L. 271
Tomingas, R. 327,328
Tosi, P. 298
Trebbin, H. 429
Trefný, J. 390
Tridents, G. 368
Turner, H. C. 353
Tyndall, R. L. 365

Upton, A. C. 241, 365

Utsumi, K. R. 356
Utz, D. C. 430

Vesselinovitch, S. D. 259,260

Wattenberg, L. W. 266
Weber, K. 385
Weisburger, E. K. 267
Weisburger, J. H. 267
Weisfeld, H. P. 327
Wellings, S. R. 402
Welsch, C. W. 283
Wheeler, G. P. 371
Wildner, G. P. 316
Wilkoff, L. J. 371
Williams, A. E. 436,437,438
Williams, W. C. 377
Windsor, M. W. 335
Wood, R. 421

Yancey, S. T. 321
Yang, J. 374
Yasuhira, K. 301,302
Young, J. L. 413
Young, S. 312

Zajdela, F. 370
Zakharov, A. F. 424
Zeilmaker, G. H. 382
Zeman, K. 384
Ziehe, K.-R. 410
Zur Hausen, H. 351

SUBJECT INDEX

- ACETAMIDE, N-6-(3,4-BENZOCOUMARINYL)-
  - mammary tumors, rat: 267
- ADRENAL CORTEX
  - dimethylbenzanthracene toxicity, effect of sex hormones or castration, rat: 298
- AIR POLLUTION
  - soot and benzpyrene, heavy-traffic street: 328
- ALBINISM
  - skin cancer, African Negroes (Uganda): 253
- AMINES, AROMATIC
  - mammary tumors, rat: 267
- AMINODIPHENYLMETHANE, 4,4'-DI-
  - liver toxicity and carcinogenesis, rat: 314
- ANDROGENS
  - effect on dimethylbenzanthracene adrenocortical toxicity, rat: 298
    - prostate, mechanism, rat: 435
  - mammary tumor sensitivity, sex difference, rat: 276
- 1,8,9-ANTHRACENETRIOL (anthralin; dithralin)
  - cocarcinogenesis, mouse: 301,302
- 2-ANTHRAMINE
  - mammary tumors, rat: 267
- ARSENIC COMPOUNDS
  - effect on WBC chromosomes *in vitro*: 290
  - skin tumors, pathology, human: 289
- AZOBENZENE, 4-DIMETHYLAMINO-
  - effect on RNA, rat liver: 261
  - liver protein binding, rat: 306
  - liver tumors, mouse: 300
- AZOBENZENE, 2',3-DIMETHYL-4-AMINO-
  - liver protein binding, rat and mouse: 306
- AZOBENZENE, 3,5-DIMETHYL-4-AMINO-
  - liver protein binding, rat: 306
- AZOBENZENE, 3,5-DIMETHYL-4-(DIMETHYLAMINO)-
  - liver protein binding, rat: 306
- AZOBENZENE, 3'-METHYL-4-(DIMETHYLAMINO)-
  - liver protein binding, rat: 306
- AZO DYES
  - liver carcinogenesis, mechanism, review: 224

- BACTERIA
  - skin saprophytes, carcinogen synthesis *in vitro*: 324
- 1,2-BENZANTHRACENE
  - analysis, laser spectroscopy: 335
  - effect on ultrastructure, rat trachea: 268
- BENZANTHRACENE, 1:2,5:6-DI-
  - skin tumors, effect of $MgCl_2$, mouse: 320
- BENZANTHRACENE, 7,12-DIMETHYL-
  - adrenal toxicity, effect of sex hormones or castration, rat: 298
  - carcinogenesis and immunity, mouse: 278
    - and karyotype, rat: 264
  - cheek pouch tumors, hamster: 269
  - effect on ultrastructure, rat trachea: 268
  - leukemogenesis, effect of bone marrow, mouse: 291
  - liver tumors, mouse: 295
  - mammary tumors, rat: 267,276,279,283,310
  - skin tumors, glycolysis, monkey: 272
    - hormone effect, rat: 277
- BENZANTHRACENE, 7,12-DIMETHYL- (Contd.)
  - skin tumors (Contd.)
    - mouse: 265,286,318
  - visceral tumors, mouse: 318
- 1,2-BENZANTHRACENE, 9,10-DIMETHYL-
  - cheek pouch tumors, effect of vitamin A, hamster: 269,299
  - epididymis tumors, animal: 287
  - mammary tumors, effect of environmental temperature, rat: 312
  - skin tumors, effect of $MgCl_2$, mouse: 320
- BENZANTHRACENE, 7,12-DIMETHYL-5-FLUORO-
  - effect on rat trachea: 268
- BENZIDINE
  - distribution, rat: 319
  - mamary tumors, rat: 267
- 3,4-BENZPYRENE
  - analysis, air of heavy-traffic street: 328
    - plant oils: 329
  - biosynthesis, fresh-water algae: 323
    - skin saprophytes *in vitro*: 324
  - cervix tumors, transplantation and *in vitro* transformation, mouse: 297
  - cheek pouch tumors and vascular abnormalities, hamster: 274
  - effect on ultrastructure, rat trachea: 268
  - epididymis tumors, animal: 287
  - hydroxylase, induction, effect of flavones, rat liver and lung: 266
  - lung, after inhalation or intratracheal admin., rat: 327
  - water solubility, effect of caffeine and other additives: 281
    - supply, reaction with chlorine peroxide: 325,326
- BETEL NUT
  - premalignant mouth lesions, Papua/New Guinea: 397
- BILIARY TRACT
  - calculi, and gallbladder cancer: 391
- BIPHENYL DERIVATIVES
  - liver tumors, mouse: 295
- BLADDER NEOPLASMS
  - epidemiology, Louisiana (New Orleans): 413
    - Transvaal: 401
- BONE MARROW
  - transfusion, effect on dimethylbenzanthracene leukemogenesis, mouse: 291
- BLOOD GROUPS
  - breast and genital cancer, women: 411
  - P factors, bronchus cancer, women: 411
- BLOOD VESSELS
  - abnormalities, benzo(α)pyrene carcinogenesis, hamster cheek pouch: 274
- BONE NEOPLASMS
  - Ewing's sarcoma, histogenesis: 434
- BRAIN NEOPLASMS
  - induction, methylnitrosourea, rat: 280
    - urethan, rat: 259
  - radium-induced meningioma, human: 257
  - risk, relationship to prior hysterectomy (artificial menopause): 399
- BRONCHUS NEOPLASMS
  - blood groups, women: 411

ONCHUS NEOPLASMS (Contd.)
  epidemiology, and peptic ulcer, Austria: 396
    review: 249

RCINOGENESIS, CHEMICAL
  leukemogenesis, review: 242
  mammary or uterus, hormone dependence, review: 225
  mechanism, mitochondrial mutation: 333
    review: 221
  relation to embryotoxicity and teratogenesis, rat: 288
    tumor-specific antigens, review: 217,236
  strain differences, mouse, review: 226
RCINOGENS
  environmental, human cancer, review: 227
  transformed cells, contact virus inhibition: 362
RVIX UTERI
  benzpyrene carcinogenesis, mouse: 297
RVIX UTERI NEOPLASMS
  cytoplasm/nucleus ratio as index of malignancy, human: 420
  epidemiology, Mexico: 393
    Poland, (Warsaw): 398
    Transvaal: 401
    review: 450
EEK POUCH
  benzopyrene carcinoma, vascular abnormalities, hamster: 274
  dimethylbenzanthracene tumors, effect of vitamin A, hamster: 269,299
LORINE PEROXICE (ClO_2)
  reaction with benzpyrene, water supply: 325, 326
ROMOSOMES
  acute leukemia: 418
  congenital abnormalities, acute leukemia, human: 424
  effect of adenovirus 12 *in vitro*: 351
    arsenic, normal human WBC: 290
  human cancer, review: 233
  malignant reticulosis, human: 432
  marker, virus-positive Burkitt lymphoma: 344
  rat mammary tumor: 428
  relation to carcinogen sensitivity, resistant or sensitive rat strains: 264
    immunoglobulin production, human normal or malignant lymph node cell lines: 433
  sex, female genital tumors: 429
    lung cancer, women: 417
  shope virus papilloma: 356,357
  specific abnormality, human tumor cells: 416
CARCINOGENESIS
  croton oil, mouse: 265,301,302
LON NEOPLASMS
  differential diagnosis: 412
  epidemiology, review: 228
NGENITAL DEFECTS
  chromosome abnormalities, acute leukemia: 424
  prenatal neuroblastoma and other tumors: 386
NNECTIVE TISSUE COMPONENTS
  chondroitin sulfate, tumor stimulation mouse: 292

CONTRACEPTIVES
  effect on tumor incidence, hybrid mouse: 263
CORPUS UTERI NEOPLASMS
  hormone dependence, mechanism, review: 225
  induction, epoxy resin hardener (diaminodiphenylmethane), rat: 314
CROTON OIL
  cocarcinogenesis, mouse: 265,301,302
    rat: 277
CYCAD NUTS
  liver and kidney tumors, rat: 282

DEXTRAN
  tumor stimulation, rabbit: 293
DITHRALIN (See 1,8,9-Anthracenetriol)

EMBRYO
  effect of carcinogens, rat: 288
ENVIRONMENT
  temperature, effect on dimethylbenzanthracene mammary carcinogenesis, rat: 312
ENVIRONMENTAL HEALTH HAZARDS
  human cancer, review: 227
ENZYMES
  benzpyrene hydroxylase, induction, effect of flavones, rat liver and lung: 266
  glycolytic, DMBA skin tumors, monkey: 272
  RNA methylase, adenovirus-induced hamster tumor: 349
EPIDEMIOLOGY
  bladder cancer, Louisiana (New Orleans): 413
    South Africa (Transvaal): 401
  bronchial cancer, Austria: 396
    review: 249
  Burkitt lymphoma, Norway, children: 400
  cervix cancer, Mexico: 393
    review: 450
    Poland (Warsaw): 398
    South Africa (Transvaal): 401
  ear/nose/throat tumors, children, Germany: 410
  larynx cancer, sex difference, Czechoslovakia (Prague): 384
  leukemia/lymphoma, children, Israel: 403
    veterinary, Great Britain: 406
  liver cancer, South Africa (Transvaal): 401
    myelolipoma, wild Felidae in captivity: 409
  lung and stomach cancer, Germany (Leipzig): 385
  methods and results: 229,392
  premalignant mouth lesions, Papua/New Guinea: 397
  relationship to environmental microelements, review: 218
  respiratory tract cancer, Czechoslovakia: 390
  spontaneous animal tumors, review: 230
  world: 228,394,404
EPIDIDYMIS
  sarcoma, benzpyrene, dimethylbenzanthracene or methylcholanthrene, animal: 287

ESOPHAGUS
  carcinogenesis, N-nitrosohexamethyleneimine, rat: 271
ESOPHAGUS NEOPLASMS
  epidemiology, review: 228
  skin carcinoma of skin tube esophageal prosthesis: 415
ESTROGENS
  effect on dimethylbenzanthracene adrenocortical toxicity, rat: 298
  kidney tumor sensitivity, hamster: 431
  mammary tumor sensitivity, rat: 276
  uptake, dimethylbenzanthracene-induced mammery tumors, rat: 279
ESTRUS CYCLE
  effect on dimethylbenzanthracene skin carcinogenesis, rat: 277
EXOCRINE GLANDS
  Harderian or Zymbal glands, carcinogenesis, urethan, rat: 259
EXTREMITY NEOPLASMS
  superficial, pre-existing lesions, African Negroes (Uganda): 253
EYE NEOPLASMS
  injuries: 258

FATTY ACIDS
  and glycerol ethers, metabolism, transplantable rat and mouse tumors: 421
FIBROSARCOMA
  induction, 4-nitroquinoline-1-oxide and derivatives, hamster: 273
FISH
  skin tumors, epidemiology, Puget Sound: 402
FLAVONE DERIVATIVES
  effect on benzpyrene hydroxylase induction, rat liver and lung: 266
FLUORENE DERIVATIVES
  liver carcinogenesis, mechanism, review: 224
FLUORENE, 2-ACETAMIDO-
  carcinogenesis, effect of methylcholanthrene, hamster: 303
  liver tumors, hamster: 305
FLUORENE, 2-DIACETAMIDO-
  liver tumors, liver, hamster: 305
2,7-FLUORENEDIAMINE
  mammary tumors, rat: 267
FOOD
  microelements, and cancer distribution, review: 218
  plant oils, analysis, polycyclic aromatic hydrocarbons: 329,330
  sausage, hydrocarbon content, effect of cooking methods: 331
FUSEL OIL
  liver toxicity and stomach tumors, rat: 316

GALLBLADDER NEOPLASMS
  and biliary calculi: 391
GASTROINTESTINAL CARCINOGENESIS
  dimethylbenzanthracene, mouse: 318
  fusel oil, rat: 316
GASTROINTESTINAL NEOPLASMS
  adenocarcinoma, carcinoembryonic antigens, human: 427
  cytodiagnosis, review (book): 219
GENETICS
  origin of tumor antigens, review: 235
GENETICS, ANIMAL
  carcinogen sensitivity and host strain, mouse, review: 226
    karyotype, rat: 264
  histocompatibility and tumor virus resistance, review: 220
  unusual tumors and hyperplastic lesions, hybrid mouse: 263
GENETICS, HUMAN
  aged siblings with kidney cancer: 407
  histocompatibility and tumor virus resistance, review: 220
  tuberous sclerosis, with angiomyolipoma of kidney: 430
GENITAL NEOPLASMS
  female, blood groups: 411
    cytodiagnosis, review (book): 219
    sex chromatin: 429

HEAD AND NECK NEOPLASMS
  ear/nose/throat, epidemiology, children, Germany: 410
  pre-existing diseases, African Negroes (Uganda): 253
HEART
  carcinogenesis, urethan, rat: 259
HETEROCYCLIC COMPOUNDS
  mammary tumors, rat: 267
HORMONES
  dependence, and chemical carcinogenesis, review: 225
    and virus carcinogenesis, review: 231
  leukemogenesis, review: 242
HORMONES, PITUITARY
  possible carcinogenesis, human: 334
HYDROCARBONS, POLYCYCLIC AROMATIC
  analysis, plant oils: 329,330
    sausage, effect of cooking methods: 331
  biosynthesis, fresh-water algae: 323
    skin saprophytes *in vitro*: 324
  carcinogenesis, rat: 288
  effect on tracheal ultrastructure, rat: 268
HYDROCORTISONE
  effect on SV40 transformation, normal cells: 345

IMMUNITY
  antibody formation, adenovirus-induced hamster tumor: 350
  antigen synthesis, adenovirus-infected normal cells: 353
  antigenic structure, avian leukosis/sarcoma viruses, review: 247
  carcinoembryonic antigens, human g.i. tumors: 427
  effect of carcinogen, mouse: 278
    Marek's disease or lymphoid leukosis virus chicken: 364

MUNITY (Contd.)
- HL-A antigens, human leukemia: 405
- host resistance, Rous sarcoma virus-infected chicken: 380
  - and tumor immunity, review: 217,220,234, 235,236
- immunoglobulin production and karyotype, human normal or malignant lymph node cell lines: 433
- mouse with viral leukemia: 369
- strain-specific, guinea pig with diethylnitrosamine hepatoma: 423
- tumor-specific antigens, antibody determination: 360
  - guinea pig with diethylnitrosamine hepatoma: 422
  - methylcholanthrene or plastic-induced tumors, mouse: 311

MUNITY DISORDERS
- scleroderma, diffuse interstitial pulmonary fibrosis and lung cancer: 395

JURIES
- burn, skin cancer, African Negroes (Uganda): 253
- eye tumors: 258

TERFERON
- effect on virus leukemia, mouse: 370

ON-CARBOHYDRATE COMPLEX
- lymphoma, mouse or rat: 332

ONICOTINIC ACID HYDRAZIDE
- and metabolite, liver tumors, mouse or rat: 294

DNEY
- benzidine distribution, rat: 319

DNEY NEOPLASMS
- angiomyolipoma (hamartoma), hereditary tuberculous sclerosis, human: 430
- epidemiology, Venezuela: 387
- estrogen sensitivity, hamster: 431
- induction
  - cycad nuts and *Zamia debilis* leaves, rat: 282
  - methylnitrosourea, rat: 321
  - nitrosomorpholine, premalignant glycogen storage disease, rat: 275
  - urethan, rat: 259
- renal cell carcinoma, aged siblings: 407
- Wilms', bilateral, child: 441

CTATION
- effect on mammary tumor development, mouse: 382

RYNX NEOPLASMS
- epidemiology, sex difference, Czechoslovakia (Prague): 384

UKEMIA, EXPERIMENTAL
- avian, review: 245,246,247,248
- bovine, review: 244
- cats and dogs, review: 243
- Friend virus (mouse), effect of thiamine deprivation: 367
- historical review: 237

LEUKEMIA, EXPERIMENTAL (Contd.)
- L-1210 (mouse), cell generation time: 371
- mouse, review: 238,239

LEUKEMIA, HUMAN
- acute karyotype: 418,424
- epidemiology, children, Israel: 403
- HL-A antigen frequency: 405

LEUKEMOGENESIS
- chemical and hormonal, review: 242
- radiation, review: 241

LEUKEMOGENESIS, EXPERIMENTAL
- dimethylbenzanthracene, mouse or rat: 264, 291,318
- methylcholanthrene, mouse or rat: 264,307
- methylnitrosourea, mouse: 321

LEUKOSIS, BOVINE
- epidemiology, Great Britain: 406

LIVER
- benzidine distribution, rat: 319
- nuclear histones, premalignant lesions, rat: 317
- protein-azo dye carcinogen binding, mechanism, rat and mouse: 306
- toxicity, epoxy resin hardener (diaminodiphenylmethane), animal and human: 314
  - fusel oil, mouse and rat: 316

LIVER CARCINOGENESIS
- acetamidofluorene, hamster: 303,305
- azo dyes or fluorenes, mechanism, review: 224
- biphenyl derivatives, mouse: 295
- cycad nuts and *Zamia debilis* leaves, rat: 282
- diacetamidofluorene, hamster: 305
- diethylnitrosamine, nuclear histones, rat: 317
- dimethylaminoazobenzene, mouse: 300
  - RNA, rat: 261
- dimethylbenzanthracene, mouse: 295,318
- dimethylnitrosamine, trout: 296
- epoxy resin hardener (diaminodiphenylmethane), rat: 314
- hepatoma or normal liver RNA, mouse: 284
- isoniazid and metabolite, mouse or rat: .294
- methylcholanthrene, hamster: 303
- N-nitrosohexamethyleneimine, rat: 271
- nitrosomorpholine, nuclear histones, rat: 317
- urethan, rat or mouse: 259,260,301

LIVER NEOPLASMS
- diethylnitrosamine hepatoma, strain- or tumor-specific immunity, guinea pig: 422,423
- epidemiology, Transvaal: 401
- metastatic, dextran stimulation, rabbit: 293
- myelolipoma, epidemiology, wild Felidae in captivity: 409

LUNG
- benzpyrene distribution, rat: 327
- diffuse interstitial fibrosis, with lung cancer: 395

LUNG CARCINOGENESIS
- dimethylbenzanthracene, mouse: 318
- methylnitrosourea, mouse: 321

LUNG NEOPLASMS
- with diffuse interstitial pulmonary fibrosis: 395
- epidemiology, Germany (Leipzig): 385
  - and peptic ulcer, Austria: 396

- LUNG NEOPLASMS (Contd.
    - review: 228
  - neonatal development, mouse: 425
  - recurrent nerve paralysis: 383
  - sex chromatin, women: 417
  - urethan, mouse: 285,322
- LYMPHOMA, MALIGNANT
  - Burkitt, epidemiology, Norway: 400
      - review: 228
    - marker chromosome and virus isolation: 344
  - epidemiology, children, Israel: 403
  - human, karyotype: 432,433
    - immunoglobulins *in vitro*: 433
  - induction, iron-carbohydrate complex, mouse or rat: 332
    - urethan + croton oil or anthracene derivative, mouse: 301
- LYMPHOSARCOMA
  - epidemiology, cattle, sheep and swine, Great Britain: 406

- MAGNESIUM CHLORIDE
  - effect on benzanthracene carcinogenesis, mouse: 320
- MAMMARY CARCINOGENESIS (EXPERIMENTAL)
  - dimethylbenzanthracene, rat: 264,283,310,312
  - methylcholanthrene, rat: 262,264
  - multiple-agent screening, rat: 267
  - urethan, rat or mouse: 259,301
- MAMMARY NEOPLASMS (EXPERIMENTAL)
  - development from mammary nodules, effect of lactation, mouse: 382
  - dimethylbenzanthracene-induced, hormone sensitivity, rat: 276,279
  - hormone sensitivity,
  - Walker 256 carcinoma, karyotype of new subline, rat: 428
- MAMMARY NEOPLASMS (HUMAN)
  - blood groups: 411
  - cystosarcoma phylloides and fibroadenoma, age incidence: 414
  - epidemiology, review: 228
- MELANOMA, MALIGNANT
  - burn injuries, African Negroes (Uganda): 253
- MENOPAUSE
  - and breast cancer risk: 399
- METABOLISM (glycolysis & respiration)
  - DMBA-induced skin tumors, monkey: 272
- 3-METHYLCHOLANTHRENE
  - carcinogenesis, effect of acetamidofluorene, hamster: 303
      - karyotype, sensitive or resistant rat strains: 264
  - distribution, mouse: 307
  - epididymis tumors, animal: 287
  - fibrosarcoma, transplantation antigens, mouse: 311
  - leukemogenesis, mechanism, mouse: 307
  - mammary tumors, effect of thyroid hormones, rat: 262
  - skin tumors, effect of embryonic skin extract, mouse: 286
- MITOCHONDRIA
  - mutation, and chemical carcinogenesis: 333
- MOTOR VEHICLES
  - exhaust gas, benzpyrene emission: 328
- MOUTH NEOPLASMS
  - premalignant, epidemiology, Papua/New Guinea, and smoking: 397

- NASAL CAVITY
  - carcinogenesis, N-nitrosohexamethyleneimine, rat: 271
- NEOPLASMS (general & unspecified)
  - growth mechanisms, review: 251
- NEOPLASMS, EXPERIMENTAL (general & unspecified)
  - carcinoma Vx2 or Vx7 (rabbit; Shope virus-induced), relative malignancy: 358
  - chemically induced, tumor-specific antigens, review: 217,236
  - Ehrlich carcinoma, effect of connective tissue components, mouse: 292
  - fatty acid and glycerol ether metabolism, rat and mouse: 421
  - hyperplastic lesions and tumors, hybrid mouse: 263
  - KB cells, RNA: 440
  - low- or high-malignancy, mouse or rat: 436, 437,438
  - mutant mouse lymphoma, DNA: 419
  - RNA metabolism, mouse: 439
  - spontaneous, distribution, review: 230
  - tumor immunity, review: 234,235
- NEOPLASMS, HUMAN (general & unspecified)
  - benign, malignant transformation, review: 252
  - epidemiology, screening methods and results: 392
    - world: 394,404
  - immunity, review: 234,236
  - multiple primary, etiology: 389
  - serodiagnosis, method: 408
  - specific chromosomal abnormality: 416
- NERVOUS SYSTEM DISEASES
  - recurrent nerve paralysis, lung cancer: 383
- NEUROBLASTOMA
  - prenatal: 386
- NITRO COMPOUNDS
  - mammary tumors, rat: 267
- 4-NITROQUINOLINE-1-OXIDE
  - and derivatives, carcinogenesis and cell transformation *in vitro*, hamster: 273
  - metabolic breakdown, rat skin: 304
- 4-NITROQUINOLINE-1-OXIDE, 6-CHLORO-
  - carcinogenesis and cell transformation *in vitro*, hamster: 273
- 4-NITROQUINOLINE-1-OXIDE, 3-METHYL-
  - carcinogenesis and cell transformation *in vitro*, hamster: 273
- NITROSAMINE DERIVATIVES
  - mechanism of action, review: 223
- NITROSAMINE, DIETHYL-
  - hepatoma, immunity, guinea pig: 422,423
  - liver, premalignant lesions, nuclear histones, rat: 317
- NITROSAMINE, DIMETHYL-
  - hepatoma, trout: 296
- NITROSOANILINE DERIVATIVES
  - teratogenesis, relationship to carcinogenesis, rat: 288

ITROSOHEXAMETHYLENEIMINE
  carcinogenesis, rat: 271
ITROSOMORPHOLINE
  premalignant lesions, kidney, rat: 275
    liver, rat: 317
ITROSOUREA, 1-METHYL-
  brain tumors, rat: 280
  kidney tumors, rat: 321
  leukemia or lung tumors, mouse: 321
ROSOUREA DERIVATIVES
  teratogenesis, relation to carcinogenesis, rat: 288
LEIC ACIDS, DNA
  effect of liver carcinogens, rat: 317
    nitrosamines, review: 223
  mutant mouse tumor: 419
  SA7 simian adenovirus, tumor induction, hamster: 352
LEIC ACIDS, RNA
  analysis, tumor cells: 440
  effect of dimethylaminoazobenzene, rat liver: 261
  enzymes, adenovirus-induced hamster tumor: 349
  metabolism, mouse tumor: 439
  normal liver or hepatoma, liver carcinogenesis, mouse: 284

UPATIONAL DISEASES
  uranium lung cancer, recurrent nerve paralysis: 383

  mineral (Freund's adjuvant), plasmacytoma, mouse: 315
HORECTOMY
  effect on
    dimethylbenzanthracene adrenocortical toxicity, rat: 298
      carcinogenesis, rat: 277,283
HIECTOMY
  effect on
    dimethylbenzanthracene adrenocortical toxicity, rat: 298
      carcinogenesis, skin, rat: 277
PHARYNGEAL NEOPLASMS
  cytodiagnosis, review, book: 219
RY NEOPLASMS
  radiation-induced, pathogenesis, mouse: 254

CREAS
  carcinogenesis, N-nitrosohexamethyleneimine, rat: 271
IS NEOPLASMS
  epidemiology, Venezuela: 388
ROLEUM
  fractions, skin tumors, mouse and rabbit: 309
UITARY GLAND
  carcinogenesis, urethan, rat: 259
  graft, effect on dimethylbenzanthracene mammary carcinogenesis, rat: 283
UITARY NEOPLASMS
  with other tumors, mechanism, human: 334
SMACYTOMA
  induction, mineral oil (Freund's adjuvant), mouse: 315

PLASTICS
  fibrosarcoma, transplantation antigens, mouse: 311
PROGESTERONE
  effect on dimethylbenzanthracene mammary carcinogenesis, rat: 279,283
PROPYLTHIOURACIL
  effect on methylcholanthrene mammary carcinogenesis, rat: 262
PROSTATE
  effect of androgens, mechanism, rat: 435

QUINOLINE, 4-AMINO-. 1-OXIDE
  carcinogenesis and cell transformation *in vitro*, hamster: 273
QUINOLINE, 4-HYDROXYAMINO-, 1-OXIDE
  carcinogenesis and cell transformation *in vitro*, hamster: 273
QUINOLINE DERIVATIVES
  carcinogenesis and cell transformation *in vitro*, hamster: 273

RADIATION
  effect on SV40 transformation, normal cells: 255,345
RADIATION CARCINOGENESIS
  animal and human, review: 222,241
  brain (meningioma), radium, human: 257
  ovary, pathogenesis, mouse: 254
  skin, human: 256
    sun exposure, African Negroes (Uganda): 253
RECTUM NEOPLASMS
  differential diagnosis: 412
REPRODUCTIVE ORGANS
  leukemia virus transmission, mouse: 366
RESPIRATORY TRACT NEOPLASMS
  cytodiagnosis, review (book): 219
  epidemiology, Czechoslovakia: 390

SARCOMA
  mesenteric, induction, acetamidofluorene + methylcholanthrene, hamster: 303
SEX
  chromatin, lung cancer, women: 417
  difference hormone sensitivity, rat mammary tumor: 276
    larynx cancer, Czechoslovakia (Prague): 384
    lung cancer with/without peptic ulcer, Austria: 396
SKIN
  nitroquinoline-1-oxide breakdown, rat: 304
  phagedenic and other ulcers, and skin cancer, African Negroes (Uganda): 253
  saprophytic bacteria, carcinogen synthesis *in vitro*: 324
SKIN CARCINOGENESIS
  dibenzanthracene, mouse: 320
  dimethylbenzanthracene, hamster: 269,299
    monkey: 272
    mouse: 265,278,286,318,320
    rat: 277
  methylcholanthrene, mouse: 286
  petroleum and fractions, mouse and rabbit: 309

SKIN CARCINOGENESIS (Contd.)
- radiation, human: 256
- tobacco smoke condensate, American & British results, mouse: 313
  - apparatus and method, mouse: 270
  - rat: 308
- urethan + croton oil or anthracene derivative, mouse: 301,302

SKIN NEOPLASMS
- arsenic-induced, pathology, human: 289
- esophageal skin-tube prosthesis: 415
- fish, distribution and pathology, Puget Sound: 402
- pre-existing diseases, African Negroes (Uganda): 253

SOIL
- microelements, and cancer distribution, review: 218

STOMACH NEOPLASMS
- epidemiology, Germany (Leipzig): 385
- forestomach, induction, fusel oil, rat: 316
- induction, N-nitrosohexamethyleneimine, rat: 271

TEMPERATURE
- environmental, effect on dimethylbenzanthracene mammary carcinogenesis, rat: 312

THIAMINE
- effect on Friend virus leukemia, mouse: 367

THYMECTOMY
- effect on Moloney (mouse) virus tumor induction, rat: 375

THYMOMA
- induction, urethan + croton oil or anthracene derivative, mouse: 301

THYMUS
- lymphoma induction, dimethylbenzanthracene, immunity, mouse: 278

THYROXINE
- effect on methylcholanthrene mammary carcinogenesis, rat: 262

TISSUE EXTRACTS
- embryonic mouse skin, effect on methylcholanthrene or dimethylbenzanthracene skin carcinogenesis, mouse: 286

TOBACCO SMOKE
- condensate, collection and skin bioassay, apparatus and method: 270
- skin tumors, American & British results, mouse: 313
  - rat: 308

TOBACCO SMOKING
- premalignant mouth lesions, Papua/New Guinea: 397

TRACHEA
- ultrastructure, effect of polycyclic aromatic hydrocarbons *in vitro*, rat: 268

ULCER, PEPTIC
- and lung cancer, sex difference, Austria: 396

UREA, (α-[2-METHYLHYDRAZINO]TOLUOYL)-
- mammary tumors, rat: 267

URETHAN
- brain and other tumors, rat: 259

URETHAN (Contd.)
- liver tumors, rat: 260
- lung tumors, mouse: 285,322
- skin tumors, mouse: 301,302

URINARY TRACT NEOPLASMS
- cytodiagnosis, review (book): 219

UTERUS
- carcinogenesis, urethan, rat: 259

UTERUS NEOPLASMS
- choriocarcinoma, primary (human) and heterotransplanted (hamster), hormone-synthesizing cell line: 426

VIRUS
- avian, Marek's disease, effect on immunity, chicken: 364
  - *in vitro* propagation: 363
- contact inhibition, normal or carcinogen-transformed cells: 362
- herpes simplex, effect of Burkitt herpes-like virus *in vitro*: 341
- host resistance, histocompatibility, animal and human, review: 220
- infectious mononucleosis, comparison to Burkitt herpes-like virus: 339,340
- polio, resistance, effect of SV40, normal cells: 346
- polyoma, extract of transformed cells, effect on normal cells: 359
- Shope papilloma, induced rabbit carcinomas (Vx2 or Vx7), relative malignancy: 358
  - tumor chromosomes *in vitro*: 356,357
- transformation, new mouse cell line: 361

VIRUS, ADENO
- antigen synthesis, temperature dependence, normal cells: 353
- SA7 (simian), DNA properties and tumor induction, hamster: 352
  - transformation, hamster cells: 354
- SV20, transformation, hamster cells: 354
- SV30 (simian) isolation, hamster tumor *in vitro* or *in vivo*: 348
- SV40
  - effect on poliovirus resistance, normal cells: 346
  - hybrid with adenovirus type 7, normal cells: 347
  - transformation, drug and radiation effects, normal cells: 255,345
- simian, classification: 355
- type 7, hybrid with SV40, normal cells: 347
- type 12, effect on host cell chromosomes: 351
  - hamster tumors, antibody formation: 350
    - RNA methylase: 349

VIRUS CARCINOGENESIS
- mechanism, review: 231,232

VIRUS, LEUKEMIA/LYMPHOMA
- avian leukemia, review: 245,246,247,248
  - lymphoid leukosis, effect on immunity, chicken: 364
- bovine leukemia, review: 244
- Burkitt (herpes-like), biological activity and morphology: 337,338
  - comparison to infectious mononucleosis virus: 339,340

RUS, LEUKEMIA/LYMPHOMA (Contd.)
- effect on herpes simplex virus *in vitro*: 341
  - WBC cultures: 342
- isolation and properties: 343
- marker chromosome: 344

- cats and dogs, review: 243
- Friend
  - effect of interferon, mouse: 370
    - thiamine deprivation, mouse: 367
  - host immunity, mouse: 369
- Graffi, host immunity, mouse: 369
  - morphology, bone marrow megakaryocytes, mouse: 368
- Gross, morphology, marrow megakaryocytes, mouse: 368
- helper activity for sarcoma virus *in vitro*, mouse: 372
- human, isolation and properties: 336,343
- isolation, milk of high- or low-tumor mouse strains: 377
- Mazurenko, host immunity, mouse: 369
- methylcholanthrene activation, mouse: 307
- Moloney host immunity, mouse: 369
  - morphology, reproductive tract, mouse: 366
  - properties of competent hybrid: 373
- mouse leukemia, review: 238,240
- Rauscher, host immunity, mouse: 369
  - properties of variant (JLS V5): 365
- release, mammary tumor virus-infected mouse mammary gland: 376

RUS, MAMMARY TUMOR (mouse)
- isolation, milk of high- or low-tumor strains: 377

VIRUS, MAMMARY TUMOR (mouse) (Contd.)
- leukemia virus-like particles, infected mammary gland: 376
- staining of budding B particles, method: 378

VIRUS, SARCOMA
- avian leukosis/sarcoma, antigenic structure, review: 247
- helper activity of leukemia virus *in vitro*, mouse: 372
- Moloney
  - tumor induction, thymectomized rat: 375
  - *in vitro* bioassay: 374
  - properties of competent hybrid: 373
- Rous
  - growth patterns, chick embryo cells: 379
  - host resistance, chicken: 380
  - transformation, guinea pig or hamster cells: 381
  - tumor induction, guinea pig or hamster: 381

VITAMIN A
- effect on dimethylbenzanthracene carcinogenesis, hamster cheek pouch: 269,299

WATER
- benzpyrene, reaction with chlorine peroxide: 326,
- fresh-water algae, carcinogen biosynthesis: 323

Zamia debilis LEAVES
- carcinogenesis, liver and kidney, rat: 282

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF H.E.W.

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

16.99405
CAR

Vet. Med.

MARCH 1969
Abstract Nos. 442-674

Vol. 7
No. 3

CARCINOGENESIS ABSTRACTS

UNIVERSITY OF ILLINOIS
OCT 27 1969
LIBRARY

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

CARCINOGENESIS ABSTRACTS

Volume 7, Number 3
March, 1969

(Submitted for Publication
December, 1968)

Abstract Numbers
442-674

CONTENTS

	Page
Review	92
Physical Carcinogenesis	97
Chemical Carcinogenesis	101
Viral Carcinogenesis	115
Epidemiology and Biometry	126
Miscellaneous	139
Author Index	i
Subject Index	iv

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a na- ional program of cooperative research in cancer, is establishing a means whereby information n the field of carcinogenesis will be coordinated and made available. The information to be ncluded will be obtained from the National Cancer Institute, other governmental agencies, and on-governmental research institutions.

The issuing of Carcinogenesis Abstracts under the auspices of the National Cancer Insti- ute will provide a central source for current abstracting of the carcinogenesis literature be- ng published throughout the world. This will help facilitate an integrated and cooperative rogram of investigation in this area. The growing number of publications in the area of car- inogenesis makes imperative the availability of an appropriate abstracting service so that in- estigators may be apprised of progress with a minimum of delay. It is our desire to provide he investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most ecently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by Index Medicus f the journal is not covered by Index Medicus, then the abbreviations (with some modifications) ound in World Medical Periodicals, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

dmin.	administered, administration	mg	milligram(s)
v.	average	min.	minute(s)
	curie(s)	ml	milliliter(s)
C	millicurie(s)	mm	millimeter(s)
C	microcurie(s)	mo.	month(s)
n	centimeter(s)	MTD	maximum tolerated dose
onc.	concentration	NIH	National Institutes of Health, USA
pm	counts per minute	p.o.	orally
NA	deoxyribonucleic acid	QO_2	oxygen quotient
Nase	deoxyribonuclease	PFU	plaque forming unit
.g.	for example	ppm	parts per million
FU	focus forming unit	pt.(s)	patient(s)
.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
	gram(s)	RES	reticuloendothelial system
g	microgram(s)	resp.	respectively
b	hemoglobin	RNA	ribonucleic acid
.a.	intra-arterial	RNase	ribonuclease
$_{50}$	median infectious dose	soln.	solution
nj.	injected, injection(s)	s.c.	subcutaneous
noc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
.p.	intraperitoneal	x	times (e.g. x 3/wk.)
.U.	international unit(s)	U	unit
.v.	intravenous	UV	ultraviolet
g	kilogram(s)	vol.	volume
$_{50}$	median lethal dose	VA	Veterans Administration
	molar, mole(s)	wt.	weight
M	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
M	micromole(s)		
x.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

.	Afrikaans	E.	English	Hun.	Hungarian	Lith.	Lithuanian	Ser.	Serbo-Croatian
.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
l.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
n.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
t.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

CARCINOGENESIS ABSTRACTS

Volume 7, Number 3

March, 1969

69-442 CHEMICAL CARCINOGENS IN THE HUMAN ENVIRONMENT, WITH PARTICULAR REFERENCE TO 3,4-BENZPYRENE, "NATURAL" CARCINOGENS AND POTENTIALLY CARCINOGENIC DRUGS. (Ger.) Schmähl, D. (Ger. Cancer Res. Inst., Heidelberg). Arzneimittelforschung 18(8):964-970, 1968. (185 references)

Air pollution with 3,4-benzpyrene (BP) and BP levels in tobacco smoke, coffee or tea and smoke-preserved foods are discussed. Natural carcinogens include aflatoxin, substances from *Penicillium islandicum* (which contaminates rice), some plant oils, cycad nuts (used to quench thirst in some Pacific islands) and arsenic. Urethan, thiouracil, griseofulvin, tannic acid and antitumor alkylating agents are carcinogenic to animals. Isoniazid causes lung tumors, leukemia and lymphosarcoma in mice, but its carcinogenic effects in man are unknown (a 30-40-yr. induction period may be required). Phenylbutazone can induce leukemia in man; anticonvulsants of the hydantoin series are known to induce lymphoma in man.

69-443 PROBLEMS AND RESULTS IN THE GEOGRAPHICAL PATHOLOGY OF CANCER. (Ger.) Wagner, G. (Ger. Cancer Res. Inst., Heidelberg). Arzneimettelforschung 18(8):953-964, 1968. (125 references)

Results of geographical epidemiology studies of cancer of the stomach, lung, breast, cervix and skin and methods of statistical evaluation and collection of data are discussed.

69-444 BIOCHEMICAL AND MOLECULAR BIOLOGICAL PROBLEMS OF TUMORIGENESIS. (Ger.) Hecker, E. (Ger. Cancer Res. Ctr., Heidelberg). Arzneimittelforschung 18(8):978-988, 1968. (51 references)

After a discussion of the 6 principal older theories of carcinogenesis (3 involving mutation, 3 involving enzyme metabolism), the current "information theory" of tumor induction (involving the structure and biological activity of DNA and RNA, and their significance as cellular information carriers) is discussed. Available models to test this theory are few, but 1 is described: biochemical studies of nucleic acids during tumor initiation (by dimethylbenzanthracene) and promotion in mouse skin.

69-445 THE INDUCTION OF CANCER BY COMBINATIONS OF VIRUSES AND OTHER AGENTS. (E.) Roe, F. J. C. (Chester Beatty Res. Inst., London) and K. E. K. Rowson. Int. Rev. Exp. Path. 6:181-227, 1968. (231 references)

Tumor induction by several types of viruses in combination with irradiation and chemicals is discussed, with several examples from the published literature. No unequivocal evidence of true multifactorial carcinogenesis (the chemical and the virus acting simultaneously or sequentially on the genetic apparatus of the susceptible cell) was found. The tumor-inducing properties of a chemical + virus combination seem to depend uniquely on the host species, the virus strain and (often) the conditions of exposure to the chemical and/or the virus.

69-446 THE BIOCHEMICAL MORPHOLOGY AND MORPHOGENESIS OF HEPATOMAS. (E.) Murray, R. K. (U. Wisconsin Med. Sch., Madison), L. Khairallah, W. Ragland and H. C. Pitot. Int. Rev. Exp. Path. 6:229-283, 1968. (192 references)

Significant alterations of the nucleus, mitochondria, endoplasmic reticulum, bile canaliculi and other infracellular structures seen in transplanted and chemically-induced rat hepatomas sometimes vary according to the tumor growth rate, but none of these deviations can be considered specific ultrastructural features of neoplasia. The marked elevation of deoxycytidylate deaminase during rapid growth of transplanted or azo dye-induced rat hepatomas is probably not an adequate marker for biliary epithelium growth, since this enzyme also occurs in the thymus and probably the lymphoid tissue, and lymphoid infiltration of the liver begins shortly after admin. of a liver toxin or carcinogen. Enzyme patterns in the hepatomas vary more widely than the histological or growth patterns. It is suggested that the common characteristic(s) of the tumors may not involve specific enzyme changes but more complex changes, such as alterations in the levels of control enzyme levels in the tumor cells. These may result from changes in the stabilization of messenger RNA templates affecting the control of genetic expression at the translational (not transcriptional) level.

69-447 ON THE NATURE OF CANCER: AN ANALYSIS FROM CONCEPTS IN CURRENT RESEARCH. Part III. (E.) Richards, V. (Pacific Med. Ctr., San Francisco, Calif.) Oncology 22(1):6-35, 1968. (20 references)

The role of immunity in tumors induced by chemicals, irradiation and viruses is discussed on the basis of recent experimental studies. Two major types of tumor-specific antigens have been identified. Antigens of virus-induced tumors are immunologically specific, but the antigenic specificity of the tumor cells (identical for all tumors induced by the same virus) differs from the antigenic specificity of the virus, suggesting that the virus causes an "instructional" change rather than being incorporated into the cell. Antigens of chemically-induced tumors are immunologically specific and differ from each other in nearly all tumors induced by the chemical (even in the same host), suggesting a direct, hereditary cellular mutation. Tumor cell antigens are not necessarily chemically or virus-induced; they behave like the histocompatibility antigens of transplanted cells and are therefore cell surface antigens. Host tolerance to the tumor may result from continuous formation of weak antigens by the tumor cells. Tumor rejection involves both cellular and humoral antibodies, but serum antibodies are also involved in tumor enhancement.

69-448 IDENTIFICATION OF INDIVIDUALS 'AT RISK' FROM CANCER. (E.) Schwarz, K. (U. Leeds, England) S. Afr. Med. J. 42(11):262-264, 1968. (No references)

The cancer mortality pattern from cancer by age, sex and occupation in Leeds, England in 1965 and possible relationships to premalignant conditions and hereditary factors are briefly reviewed. The importance of identification of "at risk" persons is stressed.

69-449 DIAGNOSTIC PROGRESS IN LUNG CANCER: HISTORICAL PERSPECTIVE. (E.) Rosenblatt, M. B. (New York Med. Coll. N. Y.) and J. R. Lisa. J. Amer. Geriat. Soc. 16(8):919-929, 1968. (72 references)

Recorded deaths of lung cancer in the U.S. were 956 in 1920, 2357 in 1930, 7121 in 1940, 18,313 in 1950, 36,420 in 1960, and 50,000 (estimated) in 1966. However, it is pointed out that diagnostic methods for lung cancer were not very accurate until the 1930's: bronchoscopy came into general use at about that time, the Papanicolaou smear of sputum has been widely used only since about 1946, mass chest X-rays were begun in the 1930's, thoracotomy has been routine only in the last 20 yr., and scalene lymph node biopsy has been in use only since 1950. In addition, the widespread publicity concerning lung cancer since 1960 has led to greater public awareness of the importance of early diagnosis. It is suggested that the "epidemic" of lung cancer since 1930 is more a reflection of improved diagnostic methods than a real increase in incidence.

69-450 BIOCHEMISTRY OF CARCINOGENESIS. (E.) Farber, E. (U. Pittsburgh Sch. Med., Pa.) Cancer Res. 28(9):1859-1870, 1968. (77 references)

The interactions of several types of carcinogens (ethionine, fluorenes, nitrosamines, azobenzenes, polycyclic aromatic hydrocarbons, viruses) with cellular macromolecules are discussed and tabulated from previously reported studies. Many carcinogens form complexes with cellular proteins, particularly the slow h-2 fraction of soluble cytoplasmic protein. Some carcinogens react with RNA (ethionine in particular; acetylaminofluorene and dimethylnitrosamine react with transfer RNA) and to a lesser extent with DNA. Tumor promotion (by mechanical injury, croton oil, phenols, etc.) may result from enhancement of the development of foci of hyperplasia of altered cells.

69-451 EXOGENIC FACTORS IN HUMAN CARCINOGENESIS AND METHODS FOR THEIR DETECTION. (E.) Schmähl, D. (German Cancer Res. Ctr., Heidelberg) Neoplasma (Bratisl.) 15(3):273-280, 1968. (75 references)

It is known, from clinical observations of occupational cancer and from the investigations into geographical pathology, that exogenous inanimate factors play an important role in the genesis of cancer (examples are cited); however, sufficient evidence is too often lacking regarding duration of exposure to the carcinogen, its conc. and the duration of the induction period. The over-all importance of environmental factors is indicated by the statement that the quantitative relationship of epithelial to connective tissue is 1:5 whereas the tumor frequency is 15:1, because epithelial tissue is in direct contact with carcinogens in the environment; hence, 90% of all tumors in man are of exogenous origin. From a toxicologic point of view there are 2 groups of carcinogens, 1 acting locally (because the substances cannot be absorbed), the other also acting internally on parenchymal structures (because the compounds are absorbed). Examples are cited, together with known values for the distribution and conc. of some carcinogens, notably 3,4-benzpyrene. The effects of nitrosamines and asbestos are also discussed. Medical education for taking proper histories to reveal past contacts of the pt. with carcinogens and statistical studies with specific reference to cancer problems are advocated. A world-wide uniform cancer register is suggested as an important aid in studying exogenous carcinogenic factors. The value of animal experimentation is stressed; although the results of such experimentation may not be directly applicable to man, it can be the source of much valuable information, partly because of the shorter life spans of animals, and also because most substances carcinogenic in animals are also carcinogenic in man.

69-452 A CHROMOSOMAL THEORY OF CARCINOGENESIS. (E.) De Grouchy, J. (Hosp. Children's Diseases, Paris) and C. De Nava. Ann. Int. Med. 69(2):381-391, 1968. (61 references)

Chromosomal rearrangements, described in malignant processes, are structural and numerical. Structural rearrangements produce marker chromosomes, the chief example of which is the Philadelphia chromosome (Ph^1) of chronic myeloid leukemia; its behavior during mitosis is compatible with a simple G chromosome deletion. Solid tumors are characterized by the almost constant presence of marker chromosomes (17-20) including abnormal chromosomes, large acrocentrics the size of A,B, or C chromosomes, and (less frequently) rings or dicentric chromosomes.

Numerical changes have led to the clonal concept of evolution (defined as any departure from euploidy); these are recognized most easily in acute transformation of human leukemia. Clonal evolution proceeds according to certain patterns, the general models of which are (1) acquisition of extra chromosomes, (2) loss of chromosomes and (3) structural rearrangements. These can be arranged in 7 modalities: duplication of the Ph^1 only; acquisition of an extra chromosome; acquisition and duplication of extra chromosomes; hypodiploidy resulting from loss of chromosomes; loss and acquisition of chromosomes; structural rearrangements; and polyploidy of aneuploid cells. Examples of all these modalities are cited. Tumors may be produced by external factors as oncogenic viruses, ionizing radiation and chemical carcinogens and by internal factors as in certain genetic diseases. According to the chromosomal theory of carcinogenesis, chromosomal aberrations are the common pathway through which carcinogens induce cancer. The chromosomal theory of carcinogenesis remains a theory without definite proof, but offers a general scheme which accounts for the available observations. It also affords opportunities for experimental confirmation; for example, newly discovered factors inducing chromosomal aberrations should increase the prevalence of malignancy, and carcinogic factors should induce chromosomal damage.

69-453 CELL PROLIFERATION IN CANCER. (E.) Bresciani, F. (U. Messina, Italy) Europ. J. Cancer 4(4):343-366, 1968.

Analysis of data from published reports of the growth rates of normal and malignant cells (animal and human) showed that unlimited cell growth arises only from an irreversible increase in the ratio between postmitotic cells remaining in the progenitor compartment to the cells progressing towards differentiation ("distribution ratio" or d-ratio). The d-ratio is directly correlated to the fraction of cells in the proliferative stages (Ip); both the d-ratio and Ip increase in solid tumor cells, compared to the corresponding normal cells in steady state. The exception is leukemic bone marrow, in which the Ip value is often below normal; this may be explained by a decrease in cell replication time (t_c) and/or an increased transit time through the non-proliferative compartments, occurring in conjunction with an increased d-ratio. (51 references)

69-454 MURINE RADIATION LEUKEMIA AND THE PRELEUKEMIC STATE. (E.) Ludwig, F. C. (U. California San Francisco Med. Ctr.), R. M. Elashoff and J. S. Wellington. Lab. Invest. 19(2): 240-251, 1968. (139 references)

A survey of the literature on radiation-induced mouse leukemias, with primary emphasis on the latent (preleukemic) period following injury, concludes that a radiation-induced preleukemic state involves a probabilistic encounter (and subsequent interaction) between virus particles and the immature cells emerging from radiobiologically altered, genetically heterogeneous hematopoietic tissues, differing only quantitatively from the encounter involved in preleukemic periods which preceded manifestation of spontaneous leukemias in either human or experimental subjects, thus offering a practical model for experimental manipulation of both leukemia-inhibiting and leukemia-enhancing mechanisms in the study of the spontaneously occurring disease. The roles of tumor viruses and immunosuppression, morphology of the hematopoietic tissues, chromosomal aberrations, clonal selection in spontaneous tumor cells and in the tissues of leukemogenically irradiated animals, leukemogenesis by single cell transfer, time dependence in the preleukemic states and the characteristics of the virus-susceptible cell are discussed.

69-455 CHROMOSOME STUDIES IN TUMOURS AND LEUKEMIA. (E.) Conen, P. E. (Hosp. Sick Child., Toronto) and B. Erkman. Canad. Med. Ass. J. 99(8):348-353, 1968. (44 references)

It has been postulated that mitotic errors and the resulting abnormal chromosomes might produce altered cells, which by uncontrolled growth could develop into neoplasms. Chromosomal morphology was studied in cells from tumors, bone marrow or peripheral blood (from leukemia pts.) and compared with cells from the equivalent tissues of control subjects without malignant disease. The Philadelphia chromosome (Ph^1), present in marrow cells in all stages of chronic granulocytic leukemia, was the only chromosomal abnormality regularly found in a malignant disease. A variety of chromosomal abnormalities, not amenable to therapy, were found in about 50% of cells from acute leukemia and malignant tumors, disappearing in remission but reappearing in relapse or recurrence. These cells showed either a consistent abnormality of chromosome number and pattern, different chromosome numbers with closely related patterns, or pseudodiploid or near-diploid patterns with structural chromosomal abnormalities. The significance of these chromosomal patterns is discussed.

69-456 VIRAL CARCINOGENESIS: PHENOMENA OF SPECIAL SIGNIFICANCE IN THE SEARCH FOR A VIRAL ETIOLOGY IN HUMAN CANCERS. (E.) Sabin, A. B. (U. Cincinnati Coll Med., Ohio). Cancer Res. 28(9):1849-1858, 1968. (62 references)

Tumor-associated viruses can be classified into 3 groups: DNA viruses responsible for naturally occurring benign tumors (papilloma in man and animals, including Shope papilloma); RNA viruses responsible for naturally occurring malignant tumors (the leukemia-sarcoma complexes in mice and chickens and the hormone-dependent mammary carcinoma of mice); and DNA viruses inducing malignant transformation in vitro and in vivo but not responsible for any naturally occurring tumors in animals or man (polyoma, SV40 and a few adenoviruses). Viruses of the first 2 groups, unlike viruses of the third group, reproduce to the infectious stage in naturally occurring tumors and cause neither CPE nor transformation in vitro. Although there is no evidence as yet that any human tumor is caused by a virus, there is also insufficient evidence to state that viruses are not implicated in certain human tumors. Phenomena of significance in the elucidation of this problem include: tumor foci induced by sarcoma viruses in vitro; apparent viral multiplication in certain tissue cultures; virus-like particles in leukemic plasma or tissues; rescue of completely "repressed" sarcoma virus genomes; and in vitro transformation of some hematopoietic target cells into myeloblasts.

69-457 IMMUNOLOGY OF CARCINOGENESIS. (E.) Haughton, G. (U. North Carolina Med. Sch., Chapel Hill) and D. B. Amos. Cancer Res. 28(9):1839-1848, 1968. (73 references)

The immunology of chemical-, virus- and radiation-induced animal tumors and some data on human cancer immunology are discussed. The isoantigen from sera of pts. with the Burkitt lymphoma behaves like a transplantation antigen; it may or may not be tumor-specific. The xenoantigens (determined by sensitization-desensitization experiments in guinea pigs) present in a wide variety of human carcinomas but not in the corresponding normal tissues, may or may not be tumor-specific.

69-458 SOME ASPECTS OF THE DEVELOPMENTAL BIOLOGY OF NEOPLASIA. (E.) Pitot, H. C. (U. Wisconsin Sch. Med., Madison). Cancer Res. 28(9):1880-1887, 1968. (55 references)

A review of the history of cancer research, biochemical approach to the study of tumors and recent studies in model systems is supplemented by a report of a study of the effects of glucose and amino acids on in vivo incorporation of valine-^{14}C into serine dehydratase in Morris Hepatoma 5123 (H-5123) in Buffalo strain rats. Under both control and experimental conditions, the tumor devoted approx. 4-5% of total soluble protein synthesis to this enzyme alone. This appeared to confirm the hypothesis that most, if not all, of the mechanisms regulating enzyme synthesis in the presence of hepatomas are ubiquitously abnormal, and that each specific tumor may have its own set of such altered control mechanisms. The effects of actinomycin D (AD) on the induction of serine dehydratase by casein hydrolysate in normal liver or in rats with Reuber Hepatoma H35 or H-5123 were also studied. Enzyme induction in normal liver became insensitive to AD 2 hr. after the initial dose and remained so throughout an additional observation period of 6 hr.; induction in H35 was completely sensitive at all times; while induction in H-5123 was completely resistant at all times. In the light of parallel phenomena seen during normal differentiation, and their relationship to template stabilization as a prerequisite to specific cellular differentiation, it is suggested that a tumor may be essentially an abnormal differentiation resulting directly from alteration of the stability of certain messenger RNA templates: a new differentiated state which is actually simply an expression of altered mechanisms for the control of enzyme synthesis. In this light, a specific tumor might be considered a newly differentiated cell type, with neoplastic differentiation (like normal differentiation) occurring without the necessity of a specific genetic alteration. If so, the mechanisms of carcinogenesis and normal cellular differentiation might well be very similar or even identical.

69-459 A RESUMÉ OF THE CURRENT STATUS OF THE DEVELOPMENT OF PLASMA-CELL TUMORS IN MICE. (E.) Potter, M. (NCI, Bethesda, Md.) Cancer Res. 28(9):1891-1896, 1968. (45 references)

A review of current reports concerning histological changes observed in plasma cell tumor development in mice includes sections on the transformation of precursors to plasma cells, the relationship of oil granuloma to plasma cell development, gene regulation and selection in plasma cell development, immunoglobulin specificity, allelic suppression and abnormalities of immunoglobulin formation in plasma cell tumors. It is concluded that at least some malignant plasma cells show evidence of specialization substantially or fully identical to that seen in the normal cell, suggesting that the carcinogenic process need not affect the specialization phenotype but may specifically affect other aspects of cellular physiology relating to growth, including (among others) the gene-controlled mechanism for stopping mitotic activity.

69-460 NEOPLASIA: A DISEASE OF CELL DIFFERENTIATION. (E.) Markert, C. L. (Yale U., New Haven, Conn.). Cancer Res. 28(9):1908-1914, 1968. (27 references)

A review of the phenomenon of malignancy from a developmental biological point of view concludes that both benign and malignant tumors represent a restricted and special class of errors, in which normal gene activity is misprogrammed by epigenetic mechanisms to produce a neoplastic pattern of metabolism in which all of the individual components are normal. The properties of neoplasms illustrate the functioning of such epigenetic mechanisms at 3 levels: direct regulation of gene function to initiate, stop or modulate the synthesis of specific kinds of RNA; regulation of cell differentiation by modifying the translation of RNA into specific proteins; and regulation of the topographic distribution and function of proteins. Even when mutant genes are clearly responsible for converting normal into neoplastic cells, they appear to act through epigenetic mechanisms to alter the normal programming of other parts of the genome. Also discussed at some length are aberrations of development expressed in specific neoplasms, teratomas as expressions of embryonic development, control mechanisms in tumors and the characteristics of the membranes of normal and malignant cells. It is concluded that both viruses and carcinogens, like the molecules involved in physiologic stress, simply change the metabolic activities of the recipient cells, and that such changes should be expressed as a change of the properties of the cell surface, thus becoming measurable.

69-461 CHEMICAL NATURE AND BIOLOGICAL ACTIVITY OF AFLATOXINS. (Rus.) Galikeev, Kh. L. (Semipalatinsk Med. Inst., USSR). Gig. Sanit. 33(8):80-83, 1968. (40 references)

69-462 INTRA- AND EXTRACELLULAR FACTORS CONTROLLING TUMORIGENESIS. (Ger.) Grundmann, E. (Farbenfabriken Bayer AG, Wuppertal-Elberfeld, Germany). Arzneimittelforschung 18(8):970-973, 1968. (20 references)

69-463 BASIS FOR CARCINOGENESIS. (Ger.) Gillmann, H. Arzneimittelforschung 18(8):951-953, 1968. (No references)

69-464 THE MAMMARY TUMOR VIRUS (MTV). (E.) Blair, P. B. (U. California, Berkeley). Pp. 1-70 in Current Topics in Microbiology and Immunology (Eds.) W. Arber, W. Braun, F. Cramer, R. Haas, W. Henle, P. H. Hofschneider, N. K. Jerne, P. Koldovsky, H. Koprowski, O. Maaløe, R. Rott, H.-G. Schweiger, M. Sela, L. Syruček, P. K. Vogt and E. Wecker. Springer-Verlag, Berlin, 1968, 237p. (205 references)

69-465 VIRUS TUMORIGENESIS. (Ger.) Munk, K. (Ger. Cancer Res. Inst., Heidelberg). Arzneimittelforschung 18(8):973-978, 1968. (14 references)

69-466 CHROMOSOME CONDITIONS IN ACUTE LEUKEMIA. (Dan.) Jensen, M. K. (City Hosp., Copenhagen). Ugeskr. Laeg. 130(34):1384-1387, 1968. (33 references)

69-467 RELATIVE IMPORTANCE OF HEREDITY AND ENVIRONMENT ON CANCER. (E.) Hadley, H. G. (Res. Found., Inc., Washington, D.C.). Praxis 57(33):1126-1131, 1968.

69-468 THE ETIOLOGY OF SQUAMOUS CARCINOMA OF THE CERVIX. (E.) Coppleson, M. (U. Sydney, Australia) and B. Reid. Obstet. Gynec. 32(3):432-436, 1968. (5 references)

69-469 METHODS OF EPIDEMIOLOGIC STUDY IN CERVIX CARCINOMA. (Ger.) Lau, H.-U. (Gynec. Clin., Charity Hosp., Berlin.). Zschr. Arztl. Fortbild. 62(14):782-785, 1968. (20 references)

69-470 CARCINOGENIC SUBSTANCES IN THE HUMAN ENVIRONMENT: METHODS OF PREVENTING CANCER (ESPECIALLY OF THE LUNG). (Fr.) Shabad, L.-M. Lyon Med. 220(32):215-230, 1968. (45 references)

See also abstract nos.: 538,539

69-471 PECULIARITIES OF CHROMOSOME CHANGES INDUCED BY IONIZING RADIATION IN MOUSE ASCITES TUMOR CELLS. (It.) Benassi, E. (U. Turin, Italy), F. Piccotti and R. Cirillo. Radiol. Med. (Torino) 44(4):305-315, 1968.

Cultures of Ehrlich ascites carcinoma and Sarcoma 180 cells (Turin lines, maintained in Swiss albino mice) were irradiated *in vitro* with an incident dose of 2000 r applied in 19 min. In addition to the usual chromosome anomalies, which gradually decreased in both tumor lines during 120 hr. after irradiation, a series of other alterations (reaching a max. about 72 hr. after irradiation) were noted; these anomalies included lengthened chromosomes with a pale color and poorly defined contours, sometimes having a "vermicular course." The chromatids were still quite clear; in other metaphases chromosomes with chain-like, filamentous and even finely dispersed forms were observed.

69-472 A STUDY OF THE INFLUENCE OF SPATIAL DISTRIBUTION OF IONIZATION ON SKIN CARCINOGENESIS USING PROTON AND ALPHA-PARTICLE BOMBARDMENT. (E.) Lippincott, S. W. (Med. Coll. Virginia, Richmond), C. P. Baker and E. E. Stickley. Radiology 91(3):537-539, 1968.

A 1-cm diameter skin area of 200 BNL mice (6-8 wk. old) was exposed to ionizing particle irradiation using accelerator-produced, monoenergetic, 10 MeV protons and 40 MeV α particles. A cylinder of skin was subjected to essentially uniform ionization to a depth of 1 mm by placing a rotating filter of variable thickness in the beam and delivering multiple Bragg peaks in depth in the paths of the charged particles. At 12 mo. after exposure to ionization from 2000 rads of proton bombardment, no epithelial neoplasms were found but distinct fibrosis was present throughout the dermis. In mice bombarded with α particles the fibrosis was much greater and a high percentage of mice developed fibrosarcomas arising in the connective tissue of the dermis and invading the underlying musculus carnosus. Foci of cells in the dermis suggestive of focal neoplasms were also seen. The major difference between the 2 particles as regards ionization in the tissues is that the α particle density is 4 times that of the protons and appears to be of underlying importance in the induction of fibrosarcomas.

69-473 STOMACH CANCER FOLLOWING IRRADIATION OF THE CELIAC REGION. (Fr.) Leger, L. (Cochin Hosp., Paris) and J.-C. Camus. Mem. Acad. Chir. (Paris) 94(14-15):454-456, 1968.

Three men developing stomach cancer 15-29 yr. after surgery and abdominal radiotherapy for another malignancy are described. One pt. had undergone unilateral orchiectomy + radiotherapy (doses not stated) for seminoma of a surgically descended testis (treated in childhood) 21 yr. before developing an ulcerating, erosive, metastasizing adenocarcinoma of the stomach (age 63 yr.). One pt. had undergone surgery + radiotherapy (7600 r) for an apparently metastatic epigastric tumor morphologically resembling testicular choriocarcinoma (although no testicular or other primary could be demonstrated) 15 yr. before surgery for adenocarcinoma of the stomach and early lymph node metastases (age 49 yr.). One pt. had undergone unilateral orchiectomy + radiotherapy (doses not stated) for testicular seminoma 29 yr. before developing an inoperable stomach tumor (undetermined histology) infiltrating the entire vertical segment of the corpus of the stomach and part of the transverse mesocolon (age 60 yr.). The presumption of an association between the earlier and later tumors raises more questions than it answers, although it cannot be ruled out.

69-474 BREAST CANCER AFTER EXPOSURE TO THE ATOMIC BOMBINGS OF HIROSHIMA AND NAGASAKI. (E.) Wanebo, C. K. (Cornell U. Med. Coll., New York City), K. G. Johnson, K. Sato and T. W. Thorslund. New Eng. J. Med. 279(13):667-671, 1968.

Histologically confirmed mammary carcinoma was found in 27/12,003 women surviving the atomic bombing of Hiroshima and Nagasaki and examined during the period 1950-1966 at clinics of the Atomic Bomb Casualty Committee, including 22/10,142 who were also examined at least once between 1958-1966 in connection with the Japanese Adult Health Study. Additional possible cases (not confirmed histologically) totaled 4 and 3, resp. Although the total number of cases observed was exactly equal to normal expectancy, based on comparable, age-specific tabulations of incidence in Miyagi Prefecture during the same time period, the number demonstrated was significantly higher than expectancy among women exposed to 90-199 rads and to more than 200 rads (4/802 compared to 1.7/802 and 5/841 compared to 2.0/841, resp.). It was significantly lower than expectancy among women not in the city at the time of the bombing or exposed to an estimated 0-9 rads (2/2458 compared to 5.4/2458 and 3/3082 compared to 6.5/3082, resp.). Comparable tabulations for women exposed to an estimated 10-39 rads were 4/1262 (expected 2.7/1262), dropping to 2/857 (expected 1.8/857) among women exposed to an estimated 40-89 rads.

69-475 CARCINOMA OF THE MALE BREAST FOLLOWING RADIATION. REPORT OF A CASE OCCURRING 35 YEARS AFTER RADIATION THERAPY OF UNILATERAL PREPUBERTAL GYNECOMASTIA. (E.) Lowell, D. M. (Waterbury Hosp., Conn.), R. G. Martineau and S. B. Luria. Cancer 22(3):581-586, 1968.

A 46-yr.-old man, who had received X-rays for 8 mo. (doses not stated) for unilateral prepubertal gynecomastia at the age of 10, underwent surgery for a small, localized infiltrating ductal carcinoma of the same breast. The skin of the chest wall showed many signs of chronic radiation effects, but no residual gynecomastia or mammary tissues were identified. The pt. reported no personal history of trauma, liver dysfunction or estrogen therapy, and no family history of cancer, diabetes, allergies or cardiovascular disease. Klinefelter's syndrome was ruled out by examination of buccal mucosal cell chromatin, which was normal. The possibility of a clinically silent abnormality of estrogen metabolism could not be excluded; it is suggested that the X-rays may have stimulated malignant transformation of the breast tissue in the presence of a genetic or constitutional predisposition to hormonal dysfunction at a relatively early age (the av. age in men with breast cancer is about 60).

69-476 CONDITION AND MORPHOLOGICAL CHARACTERISTICS OF THE ADRENAL CORTEX IN RATS DURING CARCINOGENESIS BY MINIMUM DOSES OF STRONTIUM-90. (Rus.) Berezovskii, B. S. (Vet. Inst., Kazan, U.S.S.R.). Vop. Onkol. 14(8):77-81, 1968.

In male albino rats (200-250 g), single i.p. doses of ^{90}Sr in minimum carcinogenic doses (0.05 μC/g) caused gradual changes in the host resistance to transplanted Seidel ascitic hepatoma (1.5×10^8 cells) over the next 210 days. This resistance increased from 2-12 wk. after treatment, with an increased av. survival time (26-14.5 days, compared to 10.1-14 days in controls), reduction of metastases (3/6-6/10 died with paratracheal and cervical lymph node metastases, compared to 76/80 controls), a decrease in hepatoma cells in the ascitic fluid ($2.15\text{-}8.1 \times 10^6$/mm^3 ascites, compared to $1.5\text{-}3.0 \times 10^7$ in controls) and a decreased mitotic index (0.025-0.027, compared to 0.05 in controls). However, 20 wk. after treatment the resistance was significantly reduced (av. survival time 9.7 days; 2.8×10^7 hepatoma cells in the ascites fluid; mitotic index 0.068; 9/10 showed metastases). The relative wt. increase of ascitic fluid in the first 8 wk. was related to a marked increase in the survival time. Adrenocortical hyperfunctional hyperplasia during the 30 wk. after treatment showed 2 stages: in the first 16 wk., it was accompanied by morphophysiological signs of stimulated hormone formation in the zona glomerulosa and fasciculata; 18 wk. after treatment, signs of exhaustion of the hormone-forming function of the zona fasciculata and stimulated hormone formation in the zona glomerularis and reticularis were found. The index of simultaneous changes of the wt. and zonal structure of the adrenal cortex (used for quantitative evaluation of hyperfunctional hyperplasia) was the highest (0.501) after 6 wk. and the lowest (0.069) after 30 wk. (normal 0.108).

69-477 INCIDENCE OF LEUKEMIA FOLLOWING TREATMENT OF HYPERTHYROIDISM. PRELIMINARY REPORT OF THE COOPERATIVE THYROTOXICOSIS THERAPY FOLLOW-UP STUDY. (E.) Saenger, E. L. (U. Cincinnati Coll. Med., Ohio), G. E. Thoma and E. A. Tompkins. JAMA 205(12):855-862, 1968.

Data from 22 American and 1 English centers, on 36,170 pts. treated for hyperthyroidism from 1946-1964, were studied. Follow-up data (as of June 30, 1967) were available for 33,888 pts. (7014 males, 26,874 females; 100 children under 10; 2656 non-white) treated with ^{131}I (18,379), surgery (10,731), surgery + ^{131}I (3311) or drugs alone (1467). The mean follow-up time for the entire group was 8 yr. (10.6 yr. after surgery, 6.5 yr. after ^{131}I admin.). Of the entire group, 16 pts. had leukemia at the time of treatment for hyperthyroidism (surgery in 2, drugs in 1, ^{131}I in 13). Acute and chronic leukemia developed in 24 and 20 pts., resp., after treatment with ^{131}I alone (17/18,379), ^{131}I + surgery (9/3311), drugs alone (2/1467) or surgery (16/10,731). All of the leukemia pts. were adults and all but 1 were white. The leukemia incidence/100,000 pt.-yr. in pts. treated with ^{131}I or surgery alone was 13 and 16, resp. (not a significant difference), compared to an age- and sex-adjusted incidence for the U.S. of 8.5/100,000. No significant sex difference was seen in the pts. developing leukemia after treatment for thyrotoxicosis. The leukemia mortality rate was 50% higher in the thyrotoxicosis pts. than in the U.S. population; the highest mortality rate was seen with surgery + ^{131}I.

69-478 LEUKAEMIA FOLLOWING RADIOIODINE TREATMENT OF THYROTOXICOSIS. (E.) Brownlie, B. E. W. (Princess Margaret Hosp., Christchurch, New Zealand). New Zeal. Med. J. 67(433):621-622, 1968.

About 13 yr. after receiving a course of ^{131}I (15 mC) for thyrotoxicosis and 12 yr. after a second course (12 mC), a 64-yr.-old farmer suddenly developed chronic myeloid leukemia, accompanied by a moderate-sized scrotal hematoma and marked edema of 1 thigh and leg, without preceding trauma. The pt. showed no significant lymphadenopathy but marked hepatosplenomegaly was in evidence, as was the Philadelphia chromosome. A relationship between the leukemia and prior ^{131}I treatment was considered a speculative possibility only.

69-479 CYTOPLASMIC ULTRAVIOLET EXTINCTION OF STRONTIUM-90-INDUCED FIBROBLASTIC OSTEOSARCOMAS CORRELATED TO HISTOLOGIC APPEARANCE AND ULTRASTRUCTURE. (E.) Sundelin, P. (Karolinska Hosp., Stockholm) and A. Nilsson. Acta Radiol. [Ther.] (Stockolm). 7(3):160-171, 1968.

Male CBA mice (75 days old, 22-23 g) received ^{90}Sr (0.7-0.8 μC/g x 1 i.p.) and tumor histology and UV characteristics of the resulting tumors were studied 190-377 days later. The tumors were fibroblastic osteosarcomas, characterized by scanty osteoblastic elements and relatively little osteoid formation. The material was classified by the microscopic appearance of the reticular cells in the bone marrow into 9 successively advanced stages of tumor development, which were not necessarily related to the elapsed time after treatment. The tumor cell cytoplasm showed a specific nucleic acid UV absorption peak (usually registered close to 260 mμ), which was consistently lower or absent in apparently normal fibroblasts. Approx. 40% of the cytoplasmic UV extinction values was attributable to RNA, with morphologically more advanced stages of intramedullary tumor development clearly associated with increasing extinction values. Extramedullary tumor cells had consistently lower extinction values than the peaks obtained for intramedullary tumors. In overt tumors, cells toward the periphery also appeared to contain greater amounts of cytoplasmic RNA. Cytoplasmic UV extinction reflected both ribosomal and soluble RNA, with ribosomes generally much more abundant in cells from well-established tumors. It is concluded that cells with abundant ergastoplasm of the rough type had very high UV extinction values, suggesting that they may be responsible for the abundant formation of collagen in these tumors.

69-480 THE ROLE OF VASCULAR LESIONS IN THE MALIGNANT TRANSFORMATION OF CHRONIC PEPTIC ULCER. (E.) Juhász, J. (U. Med. Sch., Budapest, Hungary). Acta Morph. Acad. Sci. Hung. 16(1):41-51, 1968.

Examination of 443 surgical specimens of stomach carcinomas showed 51 typical scar carcinomas developing from chronic gastric ulcers. Carcinomatous transformation began at the edge of the ulcer, multiple foci arising from the regenerating gastric mucosa. Under the ulcer surface, the number of capillaries running perpendicularly to the surface was significantly decreased. The proliferating epithelium near the edge of the ulcer consisted of columnar epithelium of 1-2 layers and showed no acini. It is suggested that continuous mechanical and chemical irritation destroys this weak epithelial layer, but the tendency to regenerate persists. The malignant tumor arises from continuously formed, destroyed and newly formed epithelial proliferation. Vascular changes seen in the callous ulcer and the scar carcinoma differ only quantitatively. Hypoxia prevails in the ulcer scar and in the surrounding areas as a result of vascular occlusion and causes atypical mucosal regeneration. The abnormal cell metabolism of hypoxia appears to play an important part in the genesis of scar carcinoma arising from chronic peptic ulcer and chronic callous ulcer.

69-481 CARCINOGENIC PROPERTIES OF INCREASED OXYGEN TENSIONS. I. EFFECTS ON RADIATION-INDUCED MAMMARY TUMORS. (E.) Dettmer, C. M. (Jefferson Med. Coll. Hosp., Philadelphia, Pa.), S. Kramer, S. F. Gottlieb and G. E. Aponte. J. Nat. Cancer Inst. 41(3):751-824, 1968.

The effect of increased oxygen tension on radiation-induced mammary tumors was studied in female Sprague-Dawley rats; 1 wk. after whole-body irradiation (400 rads), 1 group was kept in ordinary atmospheric air (oxygen tension 152 mm Hg) and 3 other groups (each 15 rats) were exposed to increased oxygen tension (456-2280 mm Hg; 1 hr./day, 5 days/wk.) for 6 wk. Increased oxygen tension decreased the time for emergence of primary mammary tumors and increased the tumor incidence. The earliest tumors occurred in the rats exposed to the highest oxygen tension; these appeared within 8 wk. of irradiation and 3 wk. after the last oxygen exposure. The time of appearance was inversely related to the oxygen tension. A direct relationship between the total number of tumors and the oxygen dosage was noted; 30/47 of the mammary tumors seen in the entire group were seen in rats exposed to 760 and 2280 mm Hg of oxygen tension. Second tumors were most frequent at the highest oxygen tension (42% of all second tumors were seen in this group). The 45 tumors histologically examined were of 5 different types (28 fibroadenomas including adenofibromas, 9 adenocarcinomas, 3 fibromas, 2 fibrosarcomas and 3 anaplastic tumors of the uterus, kidney and epidermis). There were no significant differences between the frequencies of the various tumor types; the groups treated with higher oxygen tension tended to have more adenocarcinomas. The distribution of tumors was similar and random for all groups. No significant differences in body wt. were seen among the groups of rats.

69-482 SCAR CANCER OF THE LUNG. (E.) Ripstein, C. B. (Brookdale Hosp. Ctr., Brooklyn, N. Y.), D. M. Spain and I. Bluth. J. Thorac. Cardiov. Surg. 56(3):362-368, 1968.

A review of a 15-yr. period demonstrated 20 pts. with lung carcinoma (bronchiolo-alveolar cell in 17, squamous cell in 2, anaplastic in 1) developing in areas of regenerative hyperplasia associated with lung scars. The etiology of the scars was known in 8 pts. (tuberculosis in 5/8, foreign body, infarct or bronchiectasis in 1/8 each). The sex distribution in this group was equal and the mean age was 57 yr. (range 28-81). A history of cigarette smoking was noted in 60% but was probably without significance. The tumors tended to be slowly progressing and formed metastases late in the course of the disease.

69-483 LEUKEMIA AND INJURIES. (Fr.) Guerci, O., G. Thibaut, J. L. Neimann and R. Herbeuval. Ann. Med. Nancy 7:621-626, 1968.

Two men and 1 woman (age 37-74) developed acute leukemia following severe bone fractures. One pt. developed leukemia several wk. after sustaining a Dupuytren fracture of the ankle; the other pts. developed leukemia about 10 mo. after an occupational fracture of the leg (1/2) or a femoral head fracture (1/2). All pts. had undergone fracture fixation by intramedullary nails; it is suggested that chronic irritation of the bone marrow by these metallic pins may have contributed to the development of leukemia. Medicolegal aspects of occupational bone fractures followed by leukemia are discussed.

69-484 SECOND PRIMARY NEOPLASMS IN CHILDREN. (E.) Tefft, M. (Harvard Sch. Med., Boston, Mass.), G. F. Vawter and A. Mitus. Amer. J. Roentgen. 103(4):800-822, 1968.

The incidence of second primary tumors in children seen at the Children's Hospital Medical Center was about 0.5%; in children admin. 1000 or more rads of radiotherapy (RT) and surviving without disease at least 2 yr., it was 5.0%. Second primary tumors in 18 children are described. The only pt. not admin. RT (usually high doses, defined as more than 1500 rads in 10 days) was a child with acute leukemia and an apparently simultaneous, unsuspected astrocytoma of the posterior pituitary (seen at autopsy). Another child had simultaneous Wilms' tumor and primary liver cancer. In the other 16 children, the second tumors appeared after intervals of control of the first tumors. Five children, admin. RT for Wilms' tumor (2), adrenal carcinoma, neuroblastoma or rhabdomyosarcoma (each 1), developed bone tumors (3 chondrosarcomas, 1 each osteogenic sarcoma or osteoblastoma) 2-14 yr. later (av. 10 yr.). Five pts. admin. RT for neuroblastoma (2), Wilms' tumor (2) or retinoblastoma (1) developed soft tissue tumors (basal cell carcinoma or melanoma of the thoracic wall; renal cell carcinoma; primary liver tumor; eosinophilic granuloma of the zygoma) 3-14 yr. later (av. 11.6 yr.). Two children treated for spinal cord ependymoma developed lymphoma or acute leukemia 6 and 27 mo. later, resp.; 1 child was treated on 3 occasions over 3.5 yr. for synovial sarcoma, then developed acute leukemia 9 yr. after the last course of treatment. Three older children (age 12.5-13 yr.) with bone sarcoma (Ewing's in 2/3, osteogenic in 1/3) developed adenocarcinoma of the breast (2/3; at age 20 or 25 yr.) or rhabdomyosarcoma of the chest (1/3; age 18.5 yr.). The role of RT in these second primary tumors could not be determined, but the possibility of radiation carcinogenesis in pts. developing tumors near portals of RT (as in 1 pt. who developed a primary liver cancer 13 yr. after RT for hepatic metastases from Wilms' tumor) could not be excluded.

69-485 TUMORS IN RATS RECEIVING PENTACIN AFTER ADMINISTRATION OF PLUTONIUM-239. (Rus.) Bukhtoiarova, E. M. (Moscow), V. K. Lemberg, R. A. Erokhin and Iu. A. Beliaev. Vop. Onkol. 14(8):71-76, 1968.

The effects of calcium ([carboxymethyl]imino)bis (ethylenenitrilo])tetraacetic acid trisodium salt (Pentacin; P; 40 mg/day x 14 i.p., repeated 3 times at 14-day intervals) on ^{239}Pu (2 μC/kg x 1 i.p.) carcinogenesis were studied in Wistar rats (145-160 g). Group I (32 males, 30 females) received ^{239}Pu alone; Groups II (28 males, 30 females), III (30 males, 31 females) and IV (26 males, 28 females) received P beginning 1 day, 1 mo. and 1 yr. after ^{239}Pu, resp.; Group V (29 males, 30 females) received P alone; Group VI (91 males, 104 females) was untreated. Av. survival times in males and females were increased by P in Groups II and III and in males of Group IV. Groups II and III showed a reduced ^{239}Pu content in the skeleton and liver and a reduced frequency of osteosarcoma (3/28 and 5/30, resp., in males, 0/61 in females of both groups; Group I, 5/32 in males, 7/30 in females). Group II also showed an increase in the latent period for soft tissue tumors; their frequency was unchanged in Group II and markedly increased in Group III. In Group IV the skeletal ^{239}Pu content was slightly decreased and the survival time somewhat increased in males only; the frequency of osteosarcoma was not decreased (5/26 males, 10/28 females). Skeletal and liver ^{239}Pu levels depended on the time of initiation of treatment with P; liver ^{239}Pu levels in Groups II, III and IV decreased by factors of 10, 3 and 2, resp. The leukemia incidence was: Group I = 2/62; Group III = 1/61; Group VI = 2/195. Reticulum cell sarcoma was seen in Groups I and III (1/62, 1/61), pulmonary lymphoreticulosarcoma in Groups II through VI (5/58, 3/61, 1/54, 3/59 and 5/195, resp.), lymphosarcoma and lymphoma in Groups III (1/61) and IV (1/54), resp. Pituitary tumors developed in Groups I through VI (4/62, 2/58, 6/61, 3/54, 6/59 and 30/195, resp.), thyroid tumors in Groups I, II, IV and V (1/62, 1/58, 1/54 and 2/59, resp.), thymus tumors in Group VI (2/195) and parathyroid tumors in Group IV (1/54). Adrenal tumors developed in all groups (13/62, 11/58, 23/61, 7/54, 6/59 and 31/195, resp. The incidence of mammary, genital, g.i. and liver tumors was: Group I = 5, 4, 2 and 16, resp.; Group II = 8, 6, 2 and 4, resp.; Group III = 17, 5, 2 and 5, resp.; Group IV = 6, 1 + 2, and 7, resp.; Group V = 5, 2, 1 and 4, resp.; Group VI = 14, 9, 1 and 2, resp. Other tumors were seen in 3-5 animals of all groups except III. The maturation and spread of osteosarcomas depended on the skeletal ^{239}Pu content and the av. survival time.

69-486 EPITHELIOMATA AFTER RADIOTHERAPY OF THE SPINE. (E.) Meara, R. H. (132 Harley St., London). Brit. J. Derm. 80(9):620, 1968.

In 6 such pts., 3/6 had associated premalignant fibroepithelioma of the skin; none showed any radiodermatitis in the affected areas.

See also abstract nos.: 445,454,506,512

69-487 EXPERIMENTAL BRAIN TUMOURS IN ALBINO MICE. (E.) Wahal, K. M. (K. G. Medical College, Lucknow, U.P., India) and I. H. Ansari. Indian J. Med. Res. 56(6):826-835, 1968.

Swiss albino mice underwent intracerebral implanttation of pellets of 3-methylcholanthrene (MC; 1:10 mixture with cholesterol) at age 70-90 days; 64-108 days later, 20/229 were also treated with X-rays (100 r over 2 days). Intracranial tumors, without distant metastases, developed 121-401 days after admin. of MC in 18/229 mice (including 6/20 admin. MC + X-rays); 17/18 tumors were clinically apparent and 1/18 was seen only on microscopic examination. Gliomas were seen in 9 mice (2/9 were also admin. X-rays) after an av. of 245 days; the growth rate was moderate and 6/9 were alive 30 days after clinical signs appeared. Glioblastoma was the most frequent type, followed by oligodendroblastoma, astroblastoma, medulloblastoma (neuroblastoma) and mixed glioma. Five mice (4/5 were admin. MC + X-rays) developed fibrosarcomas after an av. of 214 days; tumor growth was rapid and 3/5 developed extracranial extension. Mixed sarcomas + gliomas developed in 4 mice (all admin. MC alone) after 172-241 days. These brain tumors apparently developed from adult brain parenchymal cells and histologically resembled human brain tumors.

69-488 EXPERIMENTAL THYROID TUMORS IN RATS TREATED WITH ACETYLAMINOFLUORENE AND METHYLTHIOURACIL. (Bul.) Khristov, K. (Sci. Res. Inst. Oncol., Sofia). Onkologiia (Sofia) 5(2):49-60, 1968.

Methylthiouracil (MTU; 15 mg/day x 6 by intubation) alone + 2-acetylaminofluorene (AAF; 3 mg every other day x 4 by intubation) induced thyroid adenomas 1 yr. later in albino rats (both sexes); AAF alone had no effect. The 1-yr. survival rates in AAF-treated and control rats were 6/34 and 12/40, resp.; no tumors or hyperplasia of the thyroid appeared in either group. In rats treated with MTU alone, 36/88 survived 1 yr. and 6/36 of them developed 9 thyroid adenomas (3/9 each follicular, papillary and trabecular), with diffuse thyroid hyperplasia. In rats treated with MTU + AAF, the 1-yr. survival rate was 14/70; 14/14 developed 49 thyroid adenomas (34 follicular, 7 papillary, 2 each trabecular and solid), with focal thyroid hyperplasia. No malignant thyroid tumors were seen.

69-489 PSEUDO-PELGER LEUKOCYTE ANOMALY IN A CASE OF BENZENE HEMOPATHY WITH TERMINAL ACUTE LEUKEMIA. (It.) Zini, C. (U. Bologna, Italy) and M. Alessandri. Haemat. Arch. 52(3): 258-267, 1968.

A 37-yr.-old woman who had worked in a shoe factory for 14 yr., being exposed to benzene, gasoline and acetone in unknown quantities, was admitted with severe bone marrow aplasia. Examination of the WBC showed a typical nuclear anomaly of the Pelger-Huet type, apparently induced by benzene (previous histological examinations of the peripheral WBC had been normal, and the anomaly was not seen in WBC from the pt's. 2 brothers). The family and personal histories were negative except for a duodenal ulcer at age 27, which precluded corticosteroid therapy. After successful treatment the pt. was discharged; 31 mo. later she was readmitted with acute myeloblastic leukemia and died within 1 mo. This is the first reported case of a pseudo-Pelger anomaly in the early stages of benzene poisoning, preceding the development of acute leukemia.

69-490 EFFECTS OF DNA ON FREE RADICAL PRODUCTION FROM THE CARCINOGENS 4-NITRO- AND 4-HYDROXYAMINO-QUINOLINE 1-OXIDES IN AQUEOUS MEDIUM AT 77°K. (E.) Okano, T. (Tohoku U. Sch. Med., Sendai, Japan) and K. Uekama. Chem. Pharm. Bull. (Tokyo) 16(7):1411-1413, 1968.

Preliminary studies of the effect of DNA on the electron spin resonance spectroscopic behavior of 4-nitroquinoline-1-oxide (NQO) and 4-hydroxyaminoquinoline-1-oxide (HAQO) showed that DNA facilitates free radical production from NQO and hinders its production from HAQO. Since these effects were in the opposite direction (1 accelerative, the other retardative), it was suggested that this might be interpreted in terms of charge transfer between DNA and N-oxide compounds; DNA may accelerate reductive radical production from NQO and retard oxidative radical production from HAQO, through its tendency to push electrons towards the N-oxide compounds.

69-491 INTERACTION OF AROMATIC HYDROCARBONS WITH DEOXYRIBONUCLEOPROTEIN IN VITRO. (E.) Kodama, M. (Nat. Cancer Ctr. Res. Inst., Tokyo), Y. Tagashira and C. Nagata. J. Biochem. (Tokyo) 64(1):81-86, 1968.

The interaction of 3,4-benzpyrene (BP), 3-methylcholanthrene, pyrene and tetracene with calf thymus DNA nucleohistone (DNH) was investigated. The solubility of hydrocarbons in aqueous soln. was markedly increased by the presence of DNH. The max. peaks in the absorption spectra of the hydrocarbons were shifted 5-10mμ to the longer wavelength, compared to spectra in ethanol. The binding ratios of the hydrocarbons in DNH soln. were similar to hydrocarbon-DNA soln. In DNH soln. the effect of salt on the solubility of hydrocarbons differed from DNA soln. BP bound to DNH was not released from polymers by addition of salt, but coprecipitated with it in 0.15 M NaCl, whereas DNH became insoluble. The absorption of BP reappeared as DNH became soluble at higher salt conc. Hydrocarbons could be extracted from

DNH by organic solvents. Histone protein, albumin or globulin were equally effective for solubilization of hydrocarbons. Aliphatic amino acids did not dissolve hydrocarbons appreciably, but aromatic amino acids (especially tryptophan and phenylalanine) were very effective. Tyrosine, histidine and proline were less effective. Hydrocarbon-DNA and hydrocarbon-DNH solutions had the same melting points.

69-492 PULMONARY CARCINOGENESIS BY ISONIAZID AND HYDRAZINE SULFATE WITH AND WITHOUT FLUOROCARBON INDUCED INFARCTS IN OSBORNE-MENDEL/Se RATS. (It.) Ribacchi, R. (U. Perugia, Italy) and G. Giraldo. Lavori Ist. Anat. Univ. Perugia 28(1):5-19, 1968.

Osborne-Mendel rats (both sexes) with or without multiple pulmonary infarcts induced by the fluorocarbon (FC) hexachlorotetrafluorobutane (0.03 ml i.v.) were treated with 5 i.p. doses/wk. of isoniazid (INH; 10 mg/100 g) or hydrazine sulfate (HS; 6 mg/100 g) from age 85-90 days to age 400 days (total 4.5 g INH + 2.7 g HS in males, about 33% less in females). No lung tumors were seen with FC alone. FC-induced pulmonary infarcts did not affect INH or HS carcinogenesis. The lung tumor incidence in survivors (30/group at the beginning of the study) was similar with and without FC; in rats admin. INH or INH + FC, lung tumors developed in 1/10 and 1/8 males, resp., at 766 and 771 days of age (total INH dose 4500 mg). No lung tumors developed in females (4 and 8/group, resp.). In animals admin. HS alone or + FC, lung tumors were found in 1/8 and 1/11 males (age 764 and 794 days), resp., and in 1/9 and 1/5 females (age 778 and 804 days), resp. (total HS doses 2700 mg in males, 1800 mg in females). The 6 lung tumors included 2 adenomas in the early stage, 2 papillary carcinomas, 1 anaplastic carcinoma and 1 undifferentiated epidermoid carcinoma; no squamous metaplasia was seen, even in sclerotic areas of the bronchi and bronchioles. INH alone or + FC induced clear cell carcinomas of the kidney in 1/18 males (5.55%) and 2/12 females (16.66%) at the age of 1070 and 771 days, resp. No spontaneous primary kidney tumors were observed in Cb/Se, Osborne-Mendel/Se or Sprague-Dawley/Se rats bred at this institute.

69-493 ULTRASTRUCTURE OF PULMONARY TUMORS INDUCED BY HYDRAZINE SULFATE IN BALB/c/Cb/Se MICE. (It.) Bucciarelli, E. (U. Perugia, Italy), C. Biancifiori and F. Rosi. Lavori Ist. Anat. Univ. Perugia 28(1):41-55, 1968.

An aqueous soln. of hydrazine sulfate (HS), admin. by gastric intubation to 12 virgin mice (4 males, 8 females) (0.56 mg/day, total 84 mg) and 4 breeding females (1.13 mg/day, total 170 mg), induced lung tumors classified as solid and papillary adenomas with some degree of anaplasia in 100%. Ultramicroscopy revealed a similarity between the adenomatous cells and normal alveolar cells, suggesting an alveolar origin of these tumors; characteristic cytoplasmic structures of alveolar cells and these tumor cells were numerous mitochondria, an abundant endoplasmic reticulum, and typical osmophilic bodies in the homogeneous matrix and in the lamellar structure. Three types of viral particles were present: type A particles in the cisternae of the endoplasmic reticulum, with 2 membranes (70 and 40 mμ in diameter with a relatively bright center), immature C particles, observed only during the budding process of the cellular membrane, having 3 membranes surrounding a clear nucleoid (the diameter of this particle was about 100 mμ) and a third type, also situated in the cisternae of the endoplasmic reticulum, which was elongated or tubular, variable in length with 3 concentric membranes (the outermost about 70 mμ in diameter) and a clear center.

69-494 SEARCH FOR ASBESTOS BODIES IN PRIMARY MALIGNANT PULMONARY TUMORS. (It.) Peacock, P. R. (U. Perugia, Italy), C. Biancifiori and E. Bucciarelli. Lavori Ist. Anat. Univ. Perugia 28(1):29-39, 1968.

The material examined, representing 50% of the pts. treated from 1965-1967, consisted of 23 autopsy and 25 surgical specimens of primary carcinoma of the lung. These cases were studied in a search for asbestos bodies and other possible causal factors, such as smoking and the prolonged intake of drugs used in tuberculosis therapy. The histological types of tumor were anaplastic (69%), squamous cell (22%), adenocarcinoma (4%) and mixed (4%) in the autopsy material; anaplastic (28%), squamous cell (56%), adenocarcinoma (4%) and mixed (12%) in the surgical material. The search for asbestos bodies was carried out in unstained sections and in sections stained with hematoxylin - eosin or Prussian blue, and also by the micro-incineration method; the surface area of the lung examined was necessarily small (40-5300 mm^2) in relation to the total surface area. No asbestos bodies were found. This does not prove the absence of asbestos bodies in the lungs; theoretically, only the extraction of the whole lung could serve as the basis for such a statement. Of the 23 autopsy pts. 15 had been smokers, 7 had been treated for long periods with drugs used in tuberculosis therapy and 4 were smokers with histories of tuberculosis therapy.

69-495 HEPATOMA AND GROUNDNUTS IN THE WEST NILE DISTRICT OF UGANDA. (E.) Korobkin, M. (Yale U. Sch. Med., New Haven, Conn.) and E. H. Williams. Yale J. Biol. Med. 41(1):69-78, 1968.

The village distribution of peanut cultivation in the West Nile District of Uganda was compared to the village distribution of 25 cases (22 males; av. age 38.4 yr.) of hepatoma identified by clinical diagnosis over a 15-yr. period. A statistically significant similarity in distribution was noted. The possible relationship between peanuts (contaminated with aflatoxin) and the hepatoma is discussed.

69-496 ADRENOCORTICOLYTIC DERIVATIVES OF BENZ(a) ANTHRACENE. (E.) Pataki, J. (U. Chicago, Ill.), R. Wlos and Y.-J. Cho. J. Med. Chem. 11(5):1083-1086, 1968.

Syntheses of 7-chloromethyl-12-methylbenz(a) anthracene (1a), 7-bromomethyl-12-methylbenz(a) anthracene (1b), 7-methyl-12-formylbenz(a)anthracene (2a), 7-formyl-12-methylbenz(a)anthracene (1c), 7-(1-hydroxyethyl)-12-methylbenz(a)anthracene (1d), 7-(1-acetoxypropyl)-12-methylbenz(a) anthracene (1f), 7-(1-hydroxypropyl)-12-methylbenz(a)anthracene (1e), 7-methyl-12-(1-hydroxyethyl)benz(a)anthracene (2b), 7-formyl-12-hydroxymethylbenz(a)anthracene (3a), 7,12-diformylbenz(a) anthracene (3b), 7-methylene-12-ethyl-7,12-dihydrobenz(a)anthracene (4), 7-hydroxymethyl-12-ethylbenz(a)anthracene (5a), 7-formyl-12-ethylbenz(a) anthracene (5b), 7-ethyl-12-hydroxymethylbenz(a) anthracene (6a), 7-isobutyl-12-methylbenz(a) anthracene (1g), 7-acetoxy-12-methylbenz(a)anthracene (1h), 7-methoxy-12-methylbenz(a)anthracene (1i) and 7-ethoxy-12-methylbenz(a)anthracene (1j) are described. Previously published biological evaluation showed that 7-hydroxymethyl-12-methylbenz(a)anthracene (1), (1a), (1c), (1d) and (1e) induced adrenal necrosis in female Sprague-Dawley rats. The carcinogenicity of (1) was greatly reduced by comparison to 7,12-dimethylbenzanthracene; compounds (1d) and (1e) had no activity in male Long-Evans rats.

69-497 CARCINOGENIC ACTIVITY OF ANALOGS OF p-DIMETHYLAMINOAZOBENZENE. VI. ACTIVITY OF THE BENZIMIDAZOLE AND BENZTHIAZOLE ANALOGS. (E.) Brown, E. V. (U. Kentucky, Lexington) and C. J. Sanchorawala. J. Med. Chem. 11(5):1074-1075, 1968.

Groups of 10 male Sprague-Dawley rats (150-200 g) were fed a basal low-protein, low-riboflavin diet to which 0.03% of 1 of the test compounds was added. Butter yellow (p-dimethylaminoazobenzene; DAB) was tested at the 0.06% in addition to the 0.03% level. At 0.06%, DAB induced liver tumors in 7/10 after 4 mo. and in 9/10 after 6 mo.; at 0.03%, the incidence was 5/10 after 6 mo. The most active hepatocarcinogen was N,N-dimethyl-p-(6-benzthiazolylazo)aniline (BT-6), which induced tumors in 5/10 after 1 mo. and 10/10 after 2 mo. at 0.03%. At this level, the incidence with other agents was: N,N-dimethyl-p-(4-benzimidazolyazo)aniline (B I-4) = 10/10 in 2 mo.; N,N-dimethyl-p-(7-benzthiazolylazo)aniline (BT-7) = 10/10 after 3 mo.; 3'-methyl-p-dimethylaminoazobenzene (3'-MeDAB; .03%) = 5/10 after 4 mo. and 9/10 after 6 mo. No tumors were induced after 6 mo. by N,N-dimethyl-p-(benzthiazolylazo)aniline (BT-2) at .06%, or by N,N-dimethyl-p-(4-benzthiazolylazo) aniline (BT-4) or N,N-dimethyl-p-(5-benzthiazolylazo)aniline (BT-5) at .03%. The order of liver carcinogenicity in this series of experiments was BT-6> BI-4> BT-7> 3'MeDAB> DAB> BI-5, BT-4, BT-5, BT-2. BT-6 and BI-4, which induced multiple tumor nodules in 2 mo. or less, are among the most powerful known hepatocarcinogens in rats.

69-498 THE METABOLISM OF NICKEL-63 CARBONYL. (E.) Sunderman, F. W., Jr. (U. Florida Coll. Med., Gainesville) and C. E. Selin. Toxic. Appl. Pharmacol. 12(2):207-218, 1968.

Sprague-Dawley male rats (150-200 g) were admin. ^{63}Ni-labeled nickel carbonyl (Ni (CO)$_4$; a catalyst in the petroleum, rubber and plastic industries) either i.v. (2.2 mg Ni/100 g) or by inhalation (0.20 mg Ni/liter air x 15 min.). During the first 12 hr. after i.v. inj., an av. of 23.2% of the dose was excreted in the urine as ^{63}Ni; av. excretion fell to 3.7% during the second 12 hr. and the av. total urinary excretion during 4 days after inj. was 31.2%. The av. total fecal excretion was 2.4%; av. biliary excretion during the first 6 hr. after inj. was 0.2%. The lung was the major excretory organ for ^{63}Ni: 38.4% of the dose was exhaled in the first 6 hr. after inj., but no ^{63}Ni was exhaled thereafter. The av. body burden of ^{63}Ni at 24 hr. was 17.7% of the dose; most was located in muscle and fat, bone and connective tissue, viscera and blood, with 1.1% in the brain and spinal cord. At 1 hr., 51.9% of the blood ^{63}Ni was present in plasma; at 6 hr., 91.6% was in the plasma and 80.5% of this was bound to the serum proteins. At 6 hr. after inj., an av. of 1.63% was found in the lung and 0.69% in the liver.; at 24 hr. the av. content fell to 0.76% and 0.33%, resp. The tissue distribution of ^{63}Ni in rats sacrificed 24 hr. after inhalation differed from that after i.v. inj.; the proportion of ^{63}Ni in the viscera was greatly increased and the musculoskeletal system and fat levels were proportionately decreased; brain and spinal cord levels were also significantly higher.

69-499 EXAMINATION OF BISMUTH SUBCARBONATE FOR CARCINOGENIC ACTIVITY. (Ger.) Osswald, H. (German Cancer Res. Ctr., Heidelberg). Arzneimittelforschung 18(8):1064, 1968.

Of 20 male BD-VIII (100 g) rats fed bismuth subcarbonate (BS; Altromin-R; 2% in diet) throughout life except for a 1-mo. hiatus after about 4 mo. of treatment, 5/20 died of pneumonia after 223-480 days of treatment. In the other 15/20, the av. survival time was 753 ± 145 days and the av. BS dose was 296.4 ± 54.8 g. One rat (surviving 758 days; total dose 297.6 g) developed a metastatic peritoneal fibrosarcoma and a bronchial adenoma; another rat (surviving 877 days, total dose 346.8 g) developed a squamous cell lung carcinoma. This tumor incidence was about the same as the spontaneous incidence in untreated rats (not specified) of the same strain. No kidney tumors (known to be induced by lead salts) were seen in BS-treated rats.

69-500 CHANGES IN THE LEUKO-BASE METHYLENE BLUE REACTION DURING CELLULAR MALIGNANT TRANSFORMATION. (Rus.) Struve, M. E. (Lomonosov State U., Moscow). Vop. Onkol. 14(5):52-56, 1968.

The hyposulfite leuko-base methylene blue reaction (HLMR) was studied at different stages of skin carcinogenesis in 140 strain A male mice (2 mo. old) painted with 7,12-dimethylbenzanthracene (DMBA; 0.1% benzene soln., 3 doses/wk. x 56 doses), which induced keratotic squamous cell carcinomas (mostly developed from papillomas) after 50-56 doses. During hyperplasia of the tectorial epithelium (TE), the HLMR gradually decreased in the nuclei and cytoplasm and disappeared after 14 doses (this occurred at the early precancer stage) TE treated by 15 doses of DMBA showed a normal structure and positive cellular HLMR 1.5-3.5 mo. later, while cells of hyperplastic epithelium remained colorless; 1/15 mice developed cancer. At the same time interval, mice treated by 25 and 30 doses of DMBA showed malignant tumors. Similar changes of HLMR were found during malignant transformation. The HLMR reaction was also studied during s.c. sarcoma formation in 120 immature male C57 mice treated s.c. with DMBA (in peach oil); the HLMR reaction was studied in s.c. tissue particles (removed starting after 7 days of treatment, every 1-2 days to 2.4-5 mo.; polymorphocellular and spindle cell sarcoma developed from fibroblasts and small oleogranulomas after 2-4.5 mo.). In mice admin. small doses of DMBA (0.5 or 1 mg in 0.1 and 0.2 ml of peach oil, s.c.), the first detection of cellular growth was registered by the HLMR after 45 days of treatment, showing atypical cells which continued to grow with a gradually decreasing HLMR; typical tumors developed after 2.5-3.5 mo. (presarcomatous growth), with a negative HLMR. A number of mice showed the early stages of sarcoma development at 1.5-2.5 mo. In 2 groups admin. 0.5 mg of DMBA in 0.4 ml of peach oil (s.c.), all mice showed oleomas surrounded by fibrous capsule near the inj. site after 3 wk. During the development of presarcoma, the HLMR gradually decreased; it completely disappeared in formed presarcomas. These lesions were noted 50-60 days or more after the beginning of the experiment and sarcomas developed 2-4 mo. thereafter. The HLMR was also studied during the formation of mammary cancer (MC) in 25 virgin C3H mice (Group 1) and 20 breeding strain A mice (Group 2, age 2-12 mo.) and in random-bred female mice during pregnancy and lactation. Spontaneous development of MC (age 10-12 mo.) was found in 98-100% of Group 1 and 80% of Group 2 mice and was preceded by hyperplastic nodules (premalignant stage) at age 6-8 mo. Mammary acinar and ductal cells showed an intensive HLMR at age 2-4 mo., which decreased by age 6-7 mo. and disappeared at age 8-9 mo. The HLMR in pregnancy and lactation was unchanged (compared to normal controls). It is concluded that the HLMR is specific for the detection of induced or spontaneous premalignant lesions.

69-501 GINGIVAL CANCER. (E.) Srivastava, S. P., and S. C. Sharma. (S. N. Med. Coll., Agra, U.P., India). Indian J. Cancer 5(1):89-97, 1968.

A combination of tobacco, lime and betel nut was chewed by 72/85 pts. (age 28-80 yr.) treated for gingival cancer between 1957-1965 by the department of surgery of an Indian medical college. The total group represented 1.25% of all cancer pts. presenting for surgery (excluding pts. with cervical, uterine and ovarian cancer); 46.73% of all cancer pts. had some form of intraoral cancer. Beginning at age 31 yr., the incidence of gingival cancer increased progressively by 5-yr. age groups to a peak at 46-50 yr. (27/85), then decreased progressively thereafter. Oral hygiene was poor in 80/85; 43/85 smoked cigarettes (including 37/43 who also chewed the tobacco-lime-betel nut mixture); 1/85 each had histories of giant cell sarcoma of the jaw, leukoplakia and syphilis. The male:female ratio is not indicated. The nutritional status of all pts. was poor. All gingival cancers were identified histologically as squamous cell carcinomas (7/85 in Stage I, 22/85 in Stage II, 49/85 in Stage III, 7/85 in Stage IV). Lymph node metastases were seen in Stages III and IV but no remote metastases were found. The lower gum was affected in 66/85, the upper gum in 19/85.

69-502 RISKS OF LUNG CANCER IN SMOKERS WHO SWITCH TO FILTER CIGARETTES. (E.) Bross, I. D. J. (Roswell Park Mem. Inst., Buffalo, N. Y.) and R. Gibson. Amer. J. Public Health 58(8):1396-1403, 1968.

In a retrospective interview study involving 974 white male lung cancer pts. (av. age 60.2 yr.) and an equal number of matched controls without malignant disease, the use of filtered and non-filtered cigarettes (on the basis of the most recent brand smoked) was cross-tabulated by the current amount smoked and the total duration of cigarette smoking; a scale for the degree of exposure to cigarette smoke was constructed by calculating the risks of lung cancer (relative to non-smokers) for each of the time-amount categories. Tabulated were the number of yr. of cigarette smoking, the daily quantity, the relative risk if now smoking a regular cigarette and the relative risk if now smoking a filter cigarette, as follows: under 30 yr., 1 pack or less = 3.35 and 1.22, resp.; under 30 yr., more than 1 pack = 2.24 and 1.79, resp.; 30-39 yr., 1 pack or less = 6.39 and 3.07, resp.; 30-39 yr., more than 1 pack = 12.52 and 3.66, resp.; 40-49 yr., 1 pack or less = 4.78 and 4.47, resp.; 40-49 yr., more than 1 pack = 11.93 and 5.96, resp.; 50 yr. and over, under 0.5 pack = 7.27 and 4.47, resp.; 50 yr. and over, 0.5-1 pack = 8.94 and 6.71, resp.; 50 yr. and over, more than 1 pack = 26.83 and 8.94, resp. The relative risks in ex-smokers who had stopped smoking within the preceding 5 yr. (169 cases) or over 6 yr. previously (43 cases) or switched to pipes or cigars (54 cases) were 11.29, 2.44 and 6.20, resp. The increased risk in non-smokers was attributed to the health reasons for their stopping smoking, some of which were presymptomatic of lung cancer. It is concluded that, in general, the risk to filter cigarette smokers was approx. 60% of the corresponding risk to smokers of unfiltered cigarettes, although filter cigarette smokers with high exposure still run a risk which is 5 times as great as non-smokers and only slightly less than that of non-filter cigarette smokers with medium exposure.

69-503 SMOKING HABITS OF MEN EMPLOYED IN INDUSTRY, AND MORTALITY. (E.) Brett, G. Z. (Mass Radiography Serv., London) and B. Benjamin. Brit. Med. J. 3(5610):82-85, 1968.

A study population of 54,460 men (age 40 and over) who volunteered for routine X-ray examination in 1960, drawn at random from 119 industrial establishments in the Greater London Area and the Home Counties, was followed for 3 yr. to determine both the mortality rates and causes of death. Coronary thrombosis accounted for 39.0% of 1080 deaths reported, followed by cancer other than pulmonary (17.2%), cardio- and cerebrovascular diseases (15.3%) and lung cancer (13.9%). The corresponding annual rates/1000 were 2.7, 1.1, 1.0 and 0.9, resp. Cigarettes were smoked by 68.7% of the study population; 1.5% were pipe smokers, 10.5% were nonsmokers and 19.3% were ex-smokers. Cigarette consumption was classified as light (1-14 cigarettes/day) in 45.8% of the cigarette smokers, moderate (15-24/day) in 42.3% and heavy (25 or more/day) in 11.9%. The annual lung cancer mortality rate was 1.2/1000 in cigarette smokers and 0.3/1000 in both nonsmokers and ex-smokers. (Pipe smokers were included with nonsmokers for the purpose of this study). Heavy cigarette smokers had an over-all mortality rate approx. triple that of light smokers, double that of moderate smokers and 8 times that of nonsmokers. However, in age groups 50-54 yr. and over, the mortality rate among heavy smokers was 4 times that among light smokers. The highest mortality rate was seen among those who smoked heavily and allowed the cigarette to droop from the lips between puffs. As compared to nonsmokers and ex-smokers, this group showed an increased mortality rate of 14:1. The mortality rate/1000 for coronary thrombosis was 1.3 for nonsmokers, 2.3 for ex-smokers, 2.6 for light smokers, 2.9 for moderate smokers and 3.6 for heavy smokers. No significant relationship between cigarette smoking habits and mortality rates for other causes of death was demonstrable.

69-504 ESOPHAGEAL TUMORS IN SHEEP: SOME ECOLOGICAL OBSERVATIONS. (E.) Schütte, K. H. (U. Cape Town, South Africa). J. Nat. Cancer Inst. 41(3):821-824, 1968.

To prevent parasite infestation (especially tapeworm), about 6000 merino sheep on a farm near Cradock, Cape Province, South Africa were drenched from 1950-1960 for the first 1 yr. of life (every 3 wk.) with 20-30 ml of a mixture containing nicotine sulfate (1 ounce of 40% soln.) + copper sulfate (1 ounce) in 3 pints of water, admin. p.o. or by a drench gun attached to rubber tubing which extended beyond the bronchial tubes. All animals were allowed free access to a mineral sheep lick containing salt, dicalcium sulfate and a trace element mixture (66:33:1 pound mixture) to compensate for copper deficiency in the soil and forage. No other supplementary feed was given. Of the 3500 animals grazing on plateau grasslands (grassveld-covered predominantly with rooigrass [(Themeda triandra)], 8% developed tumors in the esophagus (at the termination of the esophageal tube) about 3 yr. after drenching. None of the 2500 sheep grazing in valleys and lower hills covered mainly with scrub and little grass (false karroid veld) developed esophageal tumors. No histological examinations were made and it is not known whether the tumors were malignant or benign. After changing the drench to Tetrasol (98% tetrachloroethylene) the incidence of esophageal tumors decreased sharply. Since the tumors developed only in animals grazing on grassveld and only when treated with the nicotine drench, it is suggested that they were somehow environmentally linked and possibly also triggered by the slight internal injury caused by the end of a rubber esophageal tube.

69-505 GROWTH KINETICS OF THE MOUSE EIPIDERMIS AFTER A SINGLE APPLICATION OF CIGARETTE SMOKE CONDENSATES. (E.) Elgjo, K. (Nat. Ctr. Scientific Res., Villejuif, France). Acta Path. Microbiol. Scand. 73(3):316-322, 1968.

Growth parameters (mitotic count, mitotic rate, mitotic duration) of the epidermal cell population after topical application of 0.05 ml of a 30% acetone soln. of several different tobacco smoke condensates (A, B, C, D; not characterized) which acted as weak carcinogens when tested by the sebaceous gland and hyperplasia test, were evaluated in groups of 8 mice (strain hr/hr) 1, 2, 3 and 7 days after application. Mitotic rates tripled 1 day after treatment with all condensates, then decreased to normal after 3 days. During the next 4 days they increased again and on day 7 all (except after D) were significantly higher. The duration of mitosis was very short (50% of normal) during the initial phase of rapid cell proliferation, but tended to increase as the mitotic rates declined. After application of A and B it was consistently shorter than normal, after admin. of C it was normal by day 7 and after admin. of D it increased to above normal by the end of the experiment. The mitotic count showed changes due to alterations in mitotic rate and duration. The alterations of growth parameters induced by these condensates had the characteristics of a simple regenerative reaction and resembled those found after treatment with non-carcinogenic agents. It is concluded that the specificity of the sebaceous gland and hyperplasia test relies on quantitative and not qualitative differences between the alterations induced by carcinogenic and non-carcinogenic compounds. The differences in activity between various condensates by these tests cannot be correlated with differences between the induced alterations in growth pattern of epidermal cell populations.

69-506 INFLUENCE OF CONTINUED SMOKING ON THE INCIDENCE OF SECOND PRIMARY CANCERS INVOLVING MOUTH, PHARYNX, AND LARYNX. (E.) Castigliano, S. G. (Amer. Oncologic Hosp., Philadelphia, Pa.). J. Amer. Dent. Ass. 77(3):580-585, 1968.

The incidence of second primary tumors was studied in 88 consecutive pts. seen over a 4-mo. period, who had been free of disease for 3-15 yr. after treatment of cancer of the "tobacco critical region" (tongue, mouth floor, buccal, gingiva, palate, tonsil, larynx) by surgery (29), radiotherapy (RT; 27) or surgery + RT (27). Second primary tumors of different sites and/or histology from the first tumors (5 tongue, 3 palate, 2 tonsil, 1 each buccal, lung, gingiva, palate, larynx and esophagus) developed in 16 pts. The incidence of second tumors was about the same in the pts. who had never smoked (2/11 = 14%) as in pts. who had stopped smoking (9/51 = 18%) and those who continued to smoke (5/26 = 19%); 68% of the pts. who developed second primary tumors and 66% who did not had received RT for the first tumors. In 2/16, the second primary tumors (1 fibrosarcoma and 1 carcinoma, arising 8 and 15 yr., resp., after treatment of the first tumors) were apparently radiation-induced. Both of these pts. had stopped smoking. Premalignant mucosal lesions (atrophic inflammation and leukoplakia) were present in both of the nonsmokers and in 4/9 former smokers with second primary tumors; another pt. with a second primary tumor was an alcoholic. Two pts. in this group developed third primary tumors (buccal, gingiva and lung in 1/2; mouth floor, soft palate and tongue with associated leukoplakia in 1/2, in that order). It is suggested that the risk of development of a second primary cancer in pts. treated for first primary tumors of the "tobacco critical area" is not necessarily reduced by stopping smoking, but that smoking enhances the risk of tumor development in an area of premalignant damage, especially in pts. treated with high-dose RT.

69-507 EFFECTS OF ASBESTOS IN DOCKYARD WORKERS. (E.) Sheers, G. (Plymouth Gen. Hosp., England) and A. R. Templeton. Brit. Med. J. 3(5618):574-579, 1968.

A large-scale survey (utilizing a 10% sample method) of 1504 male workers (excluding some office personnel but including 2130 supervisory and clerical workers) at the Royal Dockyard at Davenport was conducted to determine the occupational hazards of asbestos during the refitting and modernizing of ships (much of which involves removing old and installing new insulation material). Radiography and detailed analysis of exposure was made based on the number of yr. each man worked in a particular trade. Of the 1414 men examined, 42 had been continuously exposed to asbestos (lagger, sprayer, mason, sailmaker-lagger, asbestos storeman, painter) and 688 (representing approx. 6800 men) had been exposed intermittently (electrical fitter, riveter-caulker-driller, burner, welder, ship fitter, plumber-coppersmith, shipwright, engine fitter). Pulmonary fibrosis was seen in 4 men (3 in the high-risk group), all exposed less than 20 yr.; extensive pleural thickening was seen in 11 men (2 in the high risk group, 7 in trades with intermittent exposure; in 9/11 the time since first exposure exceeded 30 yr.). Limited plaques of pleural thickening were seen in 48 men (10 in the high-risk group, 27 in the intermittent-exposure group); in 35/48, the time since first exposure was more than 25 yr. and in 6 it was 15 yr. Calcification was seen in 7 of the occupational group with an av. exposure of 33 yr. The prevalence of all abnormalities attributed to asbestos exposure was 4.4% (63/1414 men). Between 1964-1967, 10 cases of mesothelioma were discovered, all in the intermittent-exposure group; in 9/10, the time since first exposure exceeded 30 yr. Two cases of bronchogenic carcinoma were seen, but association with exposure to asbestos has not been established; the incidence of this tumor conformed to the expected frequency (20 cases/yr. in dockyard workers under 65). The incidence of pleural abnormalities in the 420 continuously exposed men was about as expected (28%), compared to 1.9% in about 6800 men with little exposure and 14% in about 2000 men with over 25 yr. of intermittent exposure (50% of all pleural abnormalities, including 70/expected 110 cases of extensive pleural thickening, were in this last group).

69-508 CARCINOMA OF SCROTUM INDUCED BY MINERAL OIL. (E.) Avellán, L. (Sahlgrenska Hosp., Göteborg, Sweden), U. Breine, B. Jacobsson, and B. Johanson. Scand. J. Plast. Reconstr. Surg. 1(2):135-140, 1967.

From 1944-1957, 8 cases of moderately or highly differentiated squamous cell carcinoma of the scrotum were seen in a factory employing 250 automatic lathe operators; the incidence in this group of men was about 1400/1,000,000/yr., compared to 0.7 in the entire Swedish male population (1959-1963 data of 13 cases; Swedish Cancer Registry). The 8 pts. were 54-66 yr. old at diagnosis and had been exposed to the mineral oil lubricant for lathes for 19-43 yr. All pts. had begun working as lathe operators before the introduction of new machine models (the old model was constructed in such a way that the worker's clothing was soaked with oil) and preventive measures. Undiluted mineral oil was used for these lathes whenever possible (a 10% water-in-oil emulsion was sometimes used). Premalignant lesions (hyperkeratosis, acanthosis or squamous cell papilloma) were present simultaneously but at different sites in 3/8; 2/8 had developed premalignant scrotal lesions 2 or 9 yr. before the diagnosis of carcinoma. All pts. were treated surgically; 1/8 died with distant metastases after 1.5 yr. and another pt. died of prostatic carcinoma after 3.5 yr.; but no local recurrences were seen in any of these pts.

69-509 BENZO(a)PYRENE IN AN IRON AND STEEL WORKS. (E.) Tanimura, H. (Yawata Works Hosp., Kitakyushu, Japan). Arch. Environ. Health. 17(2):172-177, 1968.

The conc. of 3,4-benzpyrene (BP) in the air was measured during the winter and summer of 1963-1965 at several sites of a Japanese iron and steel works (coke-making, iron-making and steel-making plants, rolling mill, electric power plant, sintering plant). Av. BP levels (all sites) in suspended particulates during the winter (1963-4) and summer (1964) were 42.3 and 75.2 μg/100 m^3, resp.; av. BP levels (all sites) in falling particulates during the summer (1963) and winter (1964-5) were 67.1 and 126.9 μg/m^2/5 hr., resp. A good correlation was seen between BP levels in suspended and falling particulates. By comparison, winter and summer BP levels in the air of a neighboring industrial town were 7.70 and 2.56 μg/100 m^3, resp., in suspended particulates and 7.26 and 4.20 μg/m^2/5 hr., resp., in falling particulates. BP levels in suspended and falling particulates were over 10-12-fold higher in the winter and 60- and 30-fold higher in the summer, resp., at the steel mill than in the town. Further analysis of the data showed that the differences in BP levels were more dependent on production and furnace conditions than on seasonal differences. The highest BP levels were seen near the coke oven (apparently from smoke), blast furnace (probably from pyrolysis byproducts during iron making), electric furnace and open hearth (possibly from fuels). Other elevated BP levels elsewhere (especially the high mills at the rolling mill plant) were attributed to pyrolysis products from tar and mineral oils used as lubricators.

69-510 EXPERIMENTAL CARCINOGENESIS IN A MOLLUSK. I. CHEMICALLY INDUCED EPITHELIAL TUMORS IN THE LA PLATA APPLE SNAIL Ampullarius australis D'Orbingy (GASTROPODA, PROSOBRANCHIA). (Ger.) Krieg, K. (German Acad. Sci., Berlin). Arch. Geschwulstforsch. 32(1,2):20-34, 1968.

A group of 22 snails (Ampullarius australis D'Orbigny, about 3 cm in diameter) were inj. under anesthesia in the operculum with 3-methylcholanthrene (0.1 ml of 1% oil soln. with 0.2% croton oil added). Subsequently, prepared tissue was examined histologically and tested histochemically. After about 1 wk., 67% of the test animals died, showing many necrotic processes at the inj. site. The surviving snails showed complete sloughing of the necrotic tissue mass and subsequent closure of the wound. After latent periods of 4 and 6 mo., 2 snails showed evidence of autonomous growth processes, later diagnosed as adenocarcinoma in 1/2 and a metastasizing adenopapilloma of increasing malignancy in the other; a metastasis was found in the mantle with the structural characteristics of the primary tumor. Alveoli showed an apocrine secretion of mucopolysaccharides. Some regions of the neoplasms showed propagation of a solid mass of cells.

69-511 EXAMINATION OF THE BLOOD SUPPLY OF OESTROGEN HORMONE INDUCED PITUITARY TUMOURS IN RATS WITH INDIA INK METHOD. (E.) Tiboldi, T. (U. Med. Sch., Szeged, Hungary), M. Kurcz, K. Kovács. Neoplasma (Bratisl.) 15(3): 259-265, 1968.

The distribution of India ink (inj. into the left ventricle) in the brain, hypothalamus, pituitary and pituitary stalk was studied in 2 groups of outbred male albino rats (200 g), 1 group with large anterior pituitary adenomas induced by 6 mo. of estrone acetate admin. (doses not stated) and 1 group of untreated controls. In the untreated controls the ink always filled the vessels of the base of the brain, the portal veins of the pituitary stalk, the capillary plexuses on the dorsal and ventral surfaces of the brain and the vessels of the posterior pituitary, both lobes of the anterior pituitary and the neurohypophysis. In the tumor-bearing rats, the vessels at the base of the brain were filled with ink and the extensive vascularization of the dura surrounding the considerably enlarged pituitary was striking. Large dilated vessels, filled with ink and irregular in course, could be seen on the surface of the pituitary; under the microscope the dural vessels seemed to invade the pituitary tissue. In the larger tumors only a few thin vessels were seen in the pituitary stalk and the compressed posterior pituitary could be found only with difficulty. The tumor also compressed the mammillary bodies and caused a groove-like impression on the base of the brain; the sectioned surface of the pituitary showed grayish areas alternating with red patches. The tumor consisted of degranulated eosinophilic cells and contained many irregular cavities of varied size containing an eosinophilic colloid-like substance or RBC. Focal hemorrhages occurred frequently. Neither the cavities nor the hemorrhagic areas contained India ink granules, indicating a much decreased blood flow in these regions.

69-512 CARCINOGENIC EFFECT OF 7,12-DIMETHYLBENZ(a)ANTHRACENE ON PREVIOUSLY IRRADIATED

SKIN. (Rus.) Turusov, V. S. (Inst. Exp. Clin. Oncol., Moscow). Vop. Onkol. 14(8):66-71, 1968.

In (C57BL x CBA)F$_1$ mice admin. radiation (R; 2500 r) 45 days before the beginning of painting with 7,12-dimethylbenzanthracene (DMBA; 0.0025% benzene soln.; 1 dose/wk. x 35 wk.) on the irradiated skin, cutaneous carcinogenesis was stimulated. The first papilloma in R + DMBA-treated females and males appeared after 13 and 16 wk., resp., after the initiation of DMBA treatment, compared to 26 and 23 wk., resp., in controls treated only with DMBA. At the end of observation nearly all R + DMBA-treated mice had developed tumors, compared to 75% of controls. In controls the av. number of tumors/mouse was 1.09, compared to 1.89 with R + DMBA. In R + DMBA-treated mice, 63/187 tumors had regressed after 33-44 wk.; none of the control tumors regressed. Av. latent period of papilloma appearance was 43.5 wk. in controls and in 35.7 wk. in treated mice. The total tumor incidence (in parentheses, the number of malignant tumors) with various regimens was: DMBA alone (Group 1) = 34/45 (28); DMBA + R during the hair growth cycle (Group 2) = 50/51 (41); DMBA + R during the rest period of the hair growth cycle (Group 3) = 48/48 (42); R alone during hair growth cycle (Group 4) = 2/50 (2); R alone during the rest period of the hair growth cycle (Group 5) = 1/46 (1). Papillomas, keratoacanthomas, carcinomas and sarcomas were found in 4, 2, 27 and 1/34, resp., of Group 1; 2, 7, 41 and 0/50, resp., of Group 2 and 1, 5, 39 and 3/48, resp., of Group 3. In Groups 4 and 5, only sarcomas were found (2/50 and 1/46, resp.). During the observation time (72 days after the initiation of DMBA), 25/45 DMBA-treated mice died, 15/25 with tumors; 88% of the R + DMBA treated mice died, all with tumors. In males with combined treatment, 50% had tumors 29 wk. after the initiation of DMBA (compared to 42 wk. in non-irradiated mice and 32 and 49 wk., resp., in controls) with R alone, 10/96 died, 3/10 with tumors. DMBA + R-induced tumors were histologically similar to those induced by DMBA or R alone.

69-513 PARTICIPATION OF RNA IN THE FORMATION OF "MICROMEDIUM" BY TUMOR CELLS. (Rus.) Vinter, V. G. (State U. Postgrad. Inst., Kazan, U.S.S.R.) Vop. Onkol. 14(6):64-67, 1968.

RNA precipitated into the culture medium (CM; obtained by incub. of tumor cells in medium 199 at 37°C for 7 hr., then centrifugation and conc.) by intact Ehrlich carcinoma cells in vitro was the same as the RNA contained in ascitic fluid (AF) during the period of intensive growth of this tumor in mice. The conc. (in mμ%) of adenine (A), guanine (G), cytosine (C) and uracil (U) in RNA or CM was 24.8, 34.7, 24.6 and 16.0, resp., compared to 26.0, 32.0, 26.4 and 15.6, resp., in RNA from AF. The G + C/A + U ratio was 1.4 in both cases. Cell-free AF stimulated tumor take in male mice (20-22 g wt.) when admin. i.p. (0.2 or 0.3 ml) together with tumor cells. Preliminary treatment of AF with RNase (0.5 mg/ml) decreased this stimulation. Similar results were seen with CM after preliminary incub. of the CM with intact Ehrlich carcinoma cells. Tumor take following inoc. of 30,000 or 50,000 tumor cells in male mice treated with RNase-treated AF was 3/10 at each dose, compared to 6/10 and 10/10, resp., 7/10 and 10/10, resp., with AF alone, 0/10 and 1/10, resp., with RNA-treated CM 7/10 and 8/10, resp., with CM + RNase, 5/10 and 8/10, resp., with CM alone and 0/10 and 2/10, resp., in controls. It is concluded that cells excrete RNA into the CM, which participates in the formation of an optimal "micromedium" for the development of tumor cells.

69-514 SIGNIFICANCE OF AGE IN THE SENSITIVITY TO THE CARCINOGENIC ACTION OF 2-ACETYLAMINOFLUORENE IN RATS. (Rus.) Vasil'eva, I. A. (Petrov Res. Inst. Oncol., Leningrad, U.S.S.R.). Vop. Onkol. 14(8):58-63, 1968.

The incidence, sites and morphology of tumors induced in non-inbred white rats (both sexes) by 2-acetylaminofluorene (AAF; 4 mg/100 g/day p.o.) did not vary significantly with age. After 191 days of AAF admin. from age 2 mo. (27/30 survived until the first tumors appeared, 370 days after the first AAF dose), 20/27 survivors developed tumors (18 liver, 6 salivary gland, 4 mammary, 1 each adrenal and thyroid). After 191 days of treatment from the prenatal period to age 170 days (41/65 survived), 21/41 survivors developed tumors (19 liver, 4 salivary gland, 2 mammary, 1 eyelid). After AAF admin. from birth to age 191 days (27/44 survived), 19/27 survivors developed tumors (14 liver, 4 mammary, 1 salivary gland). The liver tumors were hepatocystocholangiomas, hepatomas or cholangiomas; the mammary tumors were adenocarcinomas and the salivary gland tumors were keratotic squamous cell carcinomas. No tumors developed in rats admin. AAF from birth to age 7 days (33/43 survived) or treated for 28 days from the prenatal period to age 7 days (29/41 survived).

69-515 CARCINOGENIC ASPECTS OF THE MAMMARY GLAND RISKS OF ESTROGEN THERAPY. (Fr.) Traissac, R. (Found. Bergonie, Bordeaux, France) and Chauvergne. J. Rev. Franc. Gynec. Obstet. 63(6):297-300, 1968.

Three women with estrogen (E)-sensitive breast carcinoma are described. In 1/3, who responded well to radiotherapy (RT), E was admin. as a justifiable therapy in a pt. of this age (78 yr.), but the tumor progressed rapidly after about 1 mo. (being controlled again by RT and surgery). One pt. (age 42 yr.) developed breast cancer after 1 mo. of E + progestogen (P) therapy for a menstrual disorder, but responded well to RT. In 1/3 (age 36 yr.) with breast cancer recurring after RT, chemotherapy and oophorectomy and refractory to further RT and chemotherapy, E therapy caused a further exacerbation with the appearance of estrogenic cells in the previously hypotrophic vaginal smear. The pt. responded to androgens.

69-516 EFFECT OF DIFFERENT ESTROGENS ON CANCER FORMATION IN THE RAT LIVER BY p-DIMETHYLAMINOAZOBENZENE (DAB). (Fr.) Lacassagne, A. (Radium Inst., Paris), Jayle, M. F. and Hurst, L. C.R. Acad. Sci. [D] (Paris). 267(1):137-140, 1968.

The liver tumor incidence was studied in adult male Wistar rats after up to 487 days of feeding low-protein and low-riboflavin diets containing 4-dimethylaminoazobenzene (DAB; 0.06 g/kg) + 6 estrogens (0.02 g/kg unless otherwise stated) of similar structures and different biological activities. The av. times of appearance of hepatomas (Stage IV) and multiple liver tumors (Stage V) with DAB alone were 105 and 145 days, resp. Addition of estrogen, estradiol, 17α-methylestradiol and equilin retarded the appearance of Stage IV changes until 124, 227, 320 and 275 days, resp.; Stage V changes appeared after an av. of 166, 279, 357 and 399 days, resp. No Stage IV or V changes appeared in rats admin. estriol or ethynylestradiol (0.002 g/kg in diet) after up to 298 and 328 days, resp.; max. pathological changes with estriol were developing or degenerating nodules separated by fibrous structures (Stage III), compared to small nodules or cysts showing areas of granulation (Stage II) with ethynylestradiol. It is concluded that substitution of methyl or ethynyl groups for hydrogen at position 17α increases the inhibitory effects of estrogens on DAB carcinogenesis.

69-517 DIETARY FACTORS AND HEPATOMA IN RAINBOW TROUT (Salmo gairdneri). I. AFLATOXINS IN VEGETABLE PROTEIN FEEDSTUFFS. (E.) Sinnhuber, R. O. (Oregon State U. Corvallis), J. H. Wales, J. L. Ayres, R. H. Engebrecht and D. L. Amend. J. Nat. Cancer Inst. 41(3):711-718, 1968.

The Oregon Test Diet (OTD), alone or + fish meal, fish meal lipid, cottonseed flour, S. foetida oil or gossypol-acetic acid, induced no hepatomas after 20 mo. in newly hatched trout, although the last 2 additives caused histological signs of liver toxicity. Addition of prepressed, solvent-extracted or expeller type cottonseed meal (CSM) to OTD resulted in hepatomas in 50% after 12 mo.; lipid extracts of both types of CSM also induced hepatomas. The SM commercial fish ration (containing 20% CSM) induced hepatomas in 100% after 9-12 mo.; a lipid extract of this ration, added to OTD, induced hepatomas in 100% after 12 mo. The carcinogen in CSM products was identified as aflatoxin (A), which induced hepatomas in 42% after 12 mo. at 0.0079 ppm; A-contaminated peanut meal, added to OTD, induced hepatomas in 42% after 9 mo.

69-518 MODIFICATIONS OF CARBOHYDRATE METABOLISM OBSERVED DURING HEPATOCARCINOGENESIS BY DIMETHYLAMINOAZOBENZENE. I. STUDIES ON GLYCOGEN METABOLISM. (Fr.) Meunier, M. (Res. Ctr. on Normal and Cancerous Cells, 94-Villejuif, France) and Jacob, A. Int. J. Cancer. 3(4):454-459, 1968.

In male Sprague-Dawley rats fed a choline- and lactalbumin-free + 10% fat diet (diet X) or a choline-free diet containing 6% fat and 5% lactalbumin (diet CY), supplemented by 4-dimethylaminoazobenzene (DAB; 0.06%), hepatomas of similar histology appeared after 8-12 or 4-8 mo. of treatment, resp. Controls were fed diets X or CY containing choline. Glycogen metabolism was studied in the liver tumors and adjacent noninvaded areas. The hypoglycemia during slow or rapid tumor invasion differed in origin with the fat content of the diet; with the higher lipid conc. (diet X) glycogen storage increased, but this was not hydrolyzed to furnish blood glucose; with the lower fat conc. (diet CY), the glycogen reserves disappeared. Thus, the glycogenic function was unstable; glycogenesis was depressed by low fat and the rate of glycogen breakdown was retarded by high fat in the diet. The only significant differences between the control groups were in glycogen synthetase (higher with diet CY) and phosphorylase conc. (higher with diet X); differences in blood glucose (normal), glycogenesis, liver content of glucose-6-phosphate and phosphoglucomutase levels were not significant.

69-519 MODIFICATIONS OF CARBOHYDRATE METABOLISM OBSERVED DURING HEPATOCARCINOGENESIS BY DIMETHYLAMINOAZOBENZENE. II. MODIFICATION OF THE RELATIVE ROLE OF THE EMBDEN-MEYERHOF PATHWAY. (Fr.) Jacob, A. (Fac. Sci., Paris). Int. J. Cancer. 3(4):460-466, 1968.

Liver enzymes of the Embden-Meyerhof pathway were studied in male Wistar rats during hepatoma induction by 4-dimethylaminoazobenzene (DAB; 0.06%) in choline-free diets containing 10% fat and no lactalbumin (diet X) or 6% fat and 5% lactalbumin (diet CY). Controls were fed diets X or CY containing choline. In controls on diet X, liver tissue respiration was decreased 27% and glycolysis increased 20%. Glucokinase, hexokinase and phosphofructokinase increased 20%, 47% and 53%, resp., with a slight (14%) reduction in pyruvate kinase. Rapid tumor invasion, especially in the early stages of DAB admin., was accompanied by a reduction of all enzymes except hexokinase; rats on the low-fat diet (CY) were more sensitive to DAB. Comparison of glucokinase and phosphofrucktokinase activity with glucose-6-phosphatase and fructose-1,6-diphosphatase showed carbohydrate breakdown overcoming carbohydrate formation during invasion of the liver by tumor cells. During this process, a larger proportion of the carbohydrates was mobilized by the pentose phosphate pathway.

69-520 A COMPARISON OF ULTRASTRUCTURAL CHANGES IN RAT LIVER DUE TO CHEMICAL CARCINOGENS.

(E.) Svoboda, D. (U. Kansas Med. Ctr., Kansas City) and J. Higginson. Cancer Res. 28(9):1703-1733, 1968.

Liver ultrastructure was studied in inbred male F-344 rats (170 g) after acute or chronic (feeding) admin. of aflatoxin B-1 (AB; 0.45 mg/kg p.o. 1-2 ppm x 16-33 wk.), diethylnitrosamine (DENA; 140 mg/kg x 1 i.p. or 0.55 mg/day x 12-23 wk.), dimethylnitrosamine (DMNA; 22.5 mg/kg x 1 i.p. or 0.4 mg/day x 24 wk.), ethionine (E; 1 mg/kg x 1 i.p. or 0.25% x 12-24 wk.), lasiocarpine (L; 80 mg/kg x 1 i.p. or 240 mg/kg/wk. x 20 wk.), 3'-methyldimethylaminoazobenzene (MeDAB; 300 mg/kg x 1 p.o. or 0.06% x 14 wk.), tannic acid (700 mg/kg x 1 s.c. or same dose x 3 wk.) or thioacetamide (TA; 60 mg/kg x 1 i.p. or 0.032% x 12-24 wk.). Tannic acid, L and the lower chronic dose of E did not induce liver tumors. The tumor incidence and (in parentheses) the time of appearance of the first tumor with the other agents were: AB, 3/6 and 9/9 (52 and 26 wk.) at the low and high chronic doses, resp.; DENA, 8/10 and 13/15 (16 and 20 wk.), resp.; DMNA, 7/15 (28 wk.); the high chronic dose of E, 10/10 (23 wk.); MeDAB, 20/21 (24 wk.); and TA, 2/20 and 8/20 (unspecified time and 48 wk.) at the low and high chronic dose, resp. A wide range of non-specific, reversible ultrastructural changes were noted in the liver cells after acute or chronic carcinogen admin. The most consistent changes were nucleolar abnormalities and disturbances of the ribosome-ergastoplasm relationship, but the 2 non-carcinogens had approx. the same ultrastructural effects as the carcinogens. None of the carcinogens induced carcinogen-specific ultrastructural characteristics in the tumor cells. The nucleolar abnormalities at the level of synthesis and assembly of the ribosomal precursors were apparently as important as the ribosome-ergastoplasm changes.

69-521 THE RELATIONSHIP OF NUCLEOLAR SEGREGATION TO RIBONUCLEIC ACID SYNTHESIS FOLLOWING THE ADMINISTRATION OF SELECTED HEPATOCARCINOGENS.

(E.) Reddy, J. (U. Kansas Med. Ctr., Kansas City) and D. Svoboda. Lab. Invest. 19(1):132-145, 1968.

Lasiocarpine (L; 80 mg/kg i.p.), 3'-methyl-4-dimethylaminoazobenzene (MeDAB, 300 mg/kg p.o.), dimethylnitrosamine (DMN; 22.5 mg/kg i.p.) and tannic acid (TA; 700 mg/kg s.c.) were admin. to inbred male F-344 weanling rats (number not stated). The relationship of nucleolar segregation to RNA synthesis in the liver was studied by light and electron microscopic autoradiography and by determining the in vivo incorporation of uridine-^{3}H (1.5 μc/g i.v.) into nuclear and ribosomal RNA. All agents caused typical nucleolar changes, which were reversed in 72 hr. after L, DMN and MeDAB and in 24 hr. after tannic acid. When nucleolar segregation was pronounced, all agents inhibited in vivo uridine-^{3}H incorporation. Autoradiography showed a significant reduction in the distribution of cytoplasmic and nuclear grains in liver cells and depression of radioactivity in the segregated nucleoli. In experimentally altered nuclei, the specific activity of RNA was lower than in controls, indicating inhibition of RNA synthesis. Similar reduction in the specific activity of ribosomal RNA was more pronounced with L and MeDAB than with the other agents. RNA polymerase activity (in vitro) of isolated segregated rat liver nucleoli, altered in vivo by admin. of these carcinogens, was significantly lower than in controls. The specific activity of RNA after 15 min. (expressed as percentage of control values) was 38% with L, 41% with TA, 55% with DMN and 60% with MeDAB. The in vivo inhibition of ^{3}H-uridine incorporation into rat liver nuclear RNA was almost completely reversed as nuclear ultrastructure returned to normal.

69-522 EFFECTS OF THE HEPATOTOXIC AGENTS RETRORSINE AND AFLATOXIN B_1 ON HEPATIC PROTEIN SYNTHESIS IN THE RAT.

(E.) Villa-Treviño, S. (Med. Res. Council, Carshalton, Surrey, England) and D. D. Leaver. Biochem. J. 109:87-91, 1968.

Admin. of aflatoxin B_1 (AB; 7 mg/kg in dimethylformamide) and retrorsine (R; 40 mg/kg in 0.9% NaCl) by stomach tube to male Porton strain Wistar rats (150-200 g) inhibited the in vivo incorporation of ^{14}C-leucine (1 μc i.p., 1 hr. before sacrifice) into liver and plasma proteins. AB inhibition of leucine incorporation into total liver and plasma proteins appeared after 3 hr. and persisted until 8 hr., while R inhibition was more marked and appeared earlier (1 hr. after admin.). Both agents affected the liver ribosomal aggregates and increased the proportion of monomers + dimers. With AB the increase was small (24%) at 1 hr. and did not increase much at 3 hr.; with R the increments were 72%, 72% and 107% after 1, 2, and 6 hr., resp. The in vitro incorporation of labeled leucine into proteins of cell-free preparations from the liver of AB-treated animals was also lower than in controls. The main site of inhibition appeared to be the ribosomes. Early (1 hr. after treatment) and significant inhibition of orotate incorporation into liver nuclear RNA was noted.

69-523 STRUCTURE AND IMPORTANCE OF INTRANUCLEAR INCLUSIONS IN THIOACETAMIDE HEPATOCARCINOGENESIS.

(E.) Kendrey, G. (Med. U., Budapest, Hungary). Acta Morph. Acad. Sci. Hung. 16(1):54-63, 1968.

In male white rats fed a standard diet and treated with thioacetamide (TAA; 25 or 50 mg/kg i.p.) for up to 6 mo., extremely large liver cells began to appear among the enlarged pericentric parenchymal cells and later at the periphery of the hepatic lobules after 3 wk. of treatment.

Nuclei were markedly swollen, the nuclear membrane was conspicuous and the chromatin content was decreased. The giant nucleoli were compact in structure; only a few contained vacuoles. Electron microscopy revealed multiple cytoplasmic indentations of the nuclear membrane in the greatly enlarged liver cells; many of the enlarged nuclei contained inclusion bodies varying in structure. Most were demarcated from the nucleoplasm by the nuclear membrane. The content of the inclusions varied widely. Where cytoplasmic invaginations were bordered by a porous double-contoured nuclear membrane, only hyaloplasm was seen, either with free ribosomes and rough endoplasmic reticulum or with smooth endoplasmic reticulum and large lipid droplets, as well as many glycogen spherules. These changes occurred only in the livers of treated animals, never in control rats. It is concluded that most of the "intranuclear inclusions" in the livers of TAA-treated rats are not true inclusion bodies, but arise in the portion of the cytoplasm that invaginates the nucleus, indicating increased synthetic activity of the liver cells.

69-524 VIRUS-LIKE PARTICLES IN REACTIVE CELLS ASSOCIATED WITH CRYSTALS OF IMPLANTED CARCINOGEN. (E.) Popoff, N. (Montefiore Hosp., Bronx, N. Y.), C. H. Sutton and H. M. Zimmerman. Acta Neuropath. (Berl.). 10(4):308-323, 1968.

In male C3H mice (7-9 wk. old) implanted intracerebrally (i.c.) with 2-mg pellets of 3,4-benzpyrene (BP), brain tumors (sarcoma or mixed glioma) appeared in 2/10 after 4 or 5.5 mo. In mice admin. 1,2,5,6-dibenzanthracene (DBA) by i.c. implantation, 5/10 developed brain sarcomas after 3.5-5 mo. The BP- and DBA-induced sarcomas were histologically similar. Premalignant lesions in the brain included areas of reactive gliosis surrounding the carcinogen pellets (which appeared as large empty spaces in the center of the region, causing a slight reaction in the adjacent parenchyma). Most of the reactive cells were true macrophages. Virus-like particles (VLP) appeared in the empty spaces surrounding the carcinogen pellets in 3/10 implanted i.c. with BP (examined 2.5-5 mo. later) and in 2/10 admin. DBA (examined after 2-3 mo.); 5/10 implanted with BP (examined after 1-6 mo.) and 3/10 admin. DBA (examined after 1-4 mo.) showed no VLP, but 2/5 BP-treated mice developed abscesses at the implantation site. The formation of VLP was obviously related to the endoplasmic reticulum. The particles were filamentous rods, sometimes in individual membrane-bounded bodies and sometimes in larger aggregates; they appeared only in those cells containing crystals of phagocytosed carcinogen. The VLP apparently did not represent an endogenous virus (since control mice implanted with graphite particles did not develop brain tumors or VLP-containing lesions), but the possibility of an unknown latent virus altered by the carcinogen is considered. Similar VLP were seen in muscle cells of mice implanted i.m. with BP pellets.

69-525 ACUTE LEUKEMIA WITH PH^1-LIKE CHROMOSOME IN AN LSD USER. (E.) Grossbard, L. (Columbia U. Coll. Physicians Surgeons, New York, N. Y.), D. Rosen, E. McGilvray, A. De Capoa, O. Miller and A. Bank. JAMA 205(11):791-793, 1968.

A 19-yr.-old male college student with a 10-mo. history of ingestion of LSD (15 doses of 100-250 μg, beginning 14 mo. previously), mescaline (4 doses), marihuana and amphetamines and a family history of hereditary spherocytosis, was admitted with acute leukemia. The abrupt onset, the absence of a history of symptoms of chronic myeloid leukemia, bone marrow and WBC pathology and a good initial response to prednisone alone all suggested primary acute myeloid leukemia (AML), although the diagnosis of chronic myeloid leukemia in acute transformation could not be excluded. Ph^1-type chromosomes were noted in peripheral blood cell cultures, but no chromosome breaks were seen in phytohemagglutinin stimulated cultures. The Ph^1 chromosome is rare in AML or in lymphocyte cultures from LSD users. This is believed to be the first reported case of acute leukemia in an LSD user.

69-526 HEPATOMA FOLLOWING CARBON TETRACHLORIDE POISONING. (E.) Tracey, J. P. (Mem. Hosp. Cancer, New York, N. Y.) and P. Sherlock. New York J. Med. 68(16):2202-2204, 1968.

A 59-yr.-old man with a history of moderately high alcohol consumption was treated for acute renal failure several days after simultaneous exposure to CCl_4 (cleaning fluid) and alcohol. Hepatomegaly was noted at this time. The pt. was lost to follow-up for 4 yr., when another examination showed hepatomegaly and elevated serum glutamic-oxalacetic transaminase; other liver function tests were normal. About 3 yr. later the pt. was readmitted with a liver mass, identified by biopsy as hepatocellular carcinoma. The pt. denied alcohol drinking since his exposure to CCl_4. Following a brief response to radiotherapy, the pt. died of disease. Autopsy showed a widespread necrotic hepatoma; moderate hepatic fibrosis was also noted, but the tumor was so extensive that the type of cirrhosis could not be determined. The possible carcinogenic effect of CCl_4 superimposed on underlying alcoholic cirrhosis is discussed, although the pt. showed no stigmata of chronic liver disease and sulfobromophthalein sodium excretion was normal at the time of diagnosis of the liver tumor. This is apparently the first reported case of hepatoma after CCl_4 poisoning in man.

69-527 EXPERIMENTAL STUDIES ON CYCLIC IMIDES. PART III: INFLUENCE OF CYCLIC IMIDES ON ENZYME INDUCTION. (Ger.) Brode, E. (Grünenthal, Inc., Stolberg, Germany). Arzneimittelforschung 18(8):1051-1052, 1968.

In Sprague-Dawley rats fed for 7 days with thalidomide (T; in 1% carboxymethylcellulose; 20-40% in diet) or the T derivative N-(1-[morpholinomethyl]-2,6-dioxo-3-piperidyl)phthalimide (CG-601; no details), hydrocortisone acetate (50 mg/kg i.p. in 1% carboxymethylcellulose, 5 hr. before sacrifice)-induced liver tryptophan pyrrolase and tyrosine-α-ketoglutarate transaminase activity were not modified by T or its derivative. In rats admin. 7,12-dimethylbenzanthracene (DMBA; 20 mg p.o. in sesame oil, 24 hr. before sacrifice) after 7 days of T feeding, liver menadione reductase activity was significantly higher than in vehicle-treated rats or animals admin. DMBA alone.

69-528 CHLORINATED DRINKING WATER. TOXICITY STUDIES IN SEVEN GENERATIONS OF RATS. (Ger.) Druckrey, H. (Max Planck Inst., Freiburg i. Br., Germany). Food Cosmet. Toxic. 6(2):147-154, 1968.

Strongly chlorinated water (100 mg/liter free Cl), admin. throughout life as drinking water to 7 generations of BDII rats, showed no toxic effects on growth life span, fertility, blood picture or the histology of different organs (liver, spleen, kidneys); the incidence of malignant and benign tumors (24 and 8, resp.) among the 236 experimental animals was the same as in the 56 controls (5 malignant and 2 benign tumors), approx. 10% in both groups. Noticeable in the treated rats was the occurrence of 15 metastasizing undifferentiated large cell lymphosarcomas of the ileocecal region, especially in the second generation (7 cases) but these were considered spontaneous tumors and not causally related to drinking of chlorinated water.

69-529 ACTIVATION OF THE TUMOR-INDUCING ABILITY OF Agrobacterium tumefaciens (SMITH AND TOWNSEND) CONN. BY MEANS OF CAPSICIN. (E.) Kujumgiev, I. (Bulgarian Acad. Sci., Sofia). Arch. Mikrobiol. 62(3):284-288, 1968.

To three Agrobacterium tumefaciens cultures developed in potato medium, 0.0025-0.01 g/5 ml of capsicin (C; raw oily alkaloid extracted from the fruit of red peppers, Capsicum annum L.) were added and the cultures kept at 30° C. After 6 hr., 0.2 ml was transferred into new sterile liquid potato medium for 40 hr. and compared with untreated cultures grown similarly. A rapid and more abundant growth of the treated culture and greater virulence was noted. The tumor-inducing ability of the C-treated culture was then compared to that of the untreated culture using Datura stramonium. After 2 wk. the plant infected with the C-treated culture developed a rapidly growing tumor at the site of infection, while a hardly noticeable spot developed in the plant infected with the untreated culture. Approx. 45 days after infection both plants died, while an uninfected control plant continued to grow.

69-530 BINDING OF AFLATOXIN BY PLASMA ALBUMIN IN VITRO. (E.) Rao, V. N. V. (Madras Med. Coll., India), K. Valmikinathan and N. Verghese. Biochim. Biophys. Acta 165(2):288-289, 1968.

Plasma from healthy individuals was incub. with dry toxin (0.2 mg/ml, from 1 ml aflatoxin [A]) for 2 hr. at 37°; A was bound with plasma albumin, as indicated by blue fluorescence in a paper electrophoretogram viewed with UV light. No green fluorescence was observed. Electrophoresis of A alone revealed both blue and green fluorescent derivatives, indicating that aflatoxin B binds with plasma albumin, whereas aflatoxin G does not. The nature of the binding of A and albumin is not clear. The studies suggest a possible in vivo transport mechanism for this mycotoxin as an albumin complex.

69-531 ONCOGENICITY BY METHYL METHANESULFONATE IN MALE RF MICE. (E.) Clapp, N. K. (Oak Ridge Nat. Lab., Tenn.), A. W. Craig and R. E. Toya, Sr. Science 161(3844):913-914, 1968.

In 11-wk.-old male non-inbred RF/Un mice treated throughout life (3-12 mo.) with methyl methanesulfonate (0.02% soln.; 30 mg/kg/day in drinking water), 70.2% developed primary lung tumors (compared to 38.9% of untreated controls). Thymic lymphomas developed in 14.9% of treated mice and 3.7% of controls; they arose in the thymus, infiltrated locally into the lungs and heart and later spread throughout the body. The disease process was similar in treated and untreated animals. Myeloid leukemia was seen in controls, (4.3%) but not in treated mice. The incidence of other types of leukemia and lymphoma (predominantly reticulum cell sarcomas) was similar in treated animals and controls.

69-532 INDUCTION OF LEUKEMIA IN DBA (-MTI) MICE BY NUCLEIC ACID DALTON'S LYMPHOMA IN ASCITES FORM. (E.) Patel, A. S. (Tata Mem. Ctr., Bombay, India). Indian J. Cancer 5(1): 120-122, 1968.

A single i.p. inj. (125 µg in 5 ml saline) of highly polymerized DNA±RNA (RNA/DNA ratio of 0.66±0.05) from ascites cells derived from Dalton's mouse lymphoma induced leukemia in 15-18% of 72 DBA (-MTI) mice (4 wk. old). The latency period was 8-10 mo. and the animals died within 75 days of diagnosis showing enlargement of the lymph nodes, spleen and liver and a terminal WBC of 48-62 x 10^3. Leukemia was of the myeloid type in 2% of the mice, the rest had lymphatic leukemia. No leukemia developed in controls receiving similar inj. of nucleic acids from the thymus of the same strain of mice. Crude spleen suspensions (1200 cells/animal) from the induced leukemias inj. into 19-23-day-old mice of the same strain (number not stated) induced, after 2 passages, leukemia in 80% of these animals within 5-7 mo. The probability of viral DNA or RNA inducing this malignancy was discounted, since no variety of tumors appeared and it was concluded that the inj. tumor cell nucleic acids played a role at the primary stage of the disease.

69-533 THE CATALYTIC INFLUENCE OF V_2O_5 ON THE OXIDATION AND ON THE DISAPPEARANCE OF CARCINOGENIC PROPERTIES OF SOME POLYCYCLIC HYDROCARBONS. (E.) Górski, T. (Inst. Oncology, Gliwice, Poland). Neoplasma (Bratisl.) 15(3): 267-271, 1968.

In hybrid (BALB/c x CBA) mice (2-4 mo.; both sexes), painting with 3-methylcholanthrene (MC; 4 drops of 0.1% acidic acetone soln., 3 doses/wk. x 3 mo.) alone induced skin papillomas in 29/40 (72.5%) and 21/29 papillomas progressed to squamous cell carcinomas. No metastases were seen. Addition of vanadium pentoxide (V_2O5; in 0.1 N HCl) to MC in a 1:1000 molar ratio (reacted for 3 days in the dark at 20° C) resulted in papillomas in 14/29 mice (48.2%), 8/14 of which progressed to carcinoma. Addition of V_2O_5 to MC in molar ratios of 1:100, 1:10 or 1:1 resulted in no tumors in 3 other groups (29 mice each). Addition of V_2O5 to acetone soln. of MC and other carcinogens (benzyprene, dimethylbenzanthracene, 1,2,5,6-dibenzanthracene, 2-acetylaminofluorene) catalyzed the oxidation of the carcinogens (measured by infrared spectra). Little or no catalytic oxidation was seen in mixtures of non-carcinogenic hydrocarbons (anthracene, fluorene, phenanthrene) with V_2O5. The oxidation of the carcinogens was apparently identical to light- or osmium tetroxide-catalyzed oxidation.

69-534 PATHODYNAMICS OF THE NEOPLASTIC PROCESS IN EXPERIMENTAL BERYLLOSIS. (Pol.) Komitowski, D. (Med. Acad., Warsaw). Med. Dosw. (Poznan) 38:57-91, 1968.

A 1% suspension of BeO (powdered) in 5 ml of physiological saline was admin. i.v. (0.05 g BeO=0.00168 g Be/dose; 2 doses/wk.) to 40 rabbits (8 mo. old, 2200 g); 20 rabbits received a total dose of 1 g BeO and 10 animals received a total dose of 0.05-0.8 g. Histological, biochemical and histochemical examinations, performed 3-18 mo. after the beginning of treatment, revealed 3 phases of beryllosis development: the initial phase, fibrosis and neoplasms. The initial phase, lasting approx. 3 mo., was characterized by vacuolar and droplet hyaline degeneration of the liver and degeneration of hyaline membranes in the pulmonary alveoli, beginning in the blood vessels. During the phase of fibrosis, marked proliferation of reticulin fibers in the liver was seen, resulting in a pseudolobular pattern. Proliferative and degenerative processes were parallel. Fibrosis was most pronounced in the lungs, spleen and bone marrow and least significant in the kidneys. In the liver it resembled cirrhosis. In 70% of the animals, connective tissue proliferation was not preceded by degeneration of parenchyma cells. Acid mucopolysaccharide levels were high, indicating disturbances of polymerization and esterification. Inhibition of alkaline phosphatase differed in different organs; it was greatest in the kidneys and seemed to depend on size of BeO particles. Bone marrow fibrosis was regarded as a preneoplastic state; the fibrous tissue of bone marrow was morphologically and histochemically similar to the connective tissue proliferating in the lungs. Bone marrow neoplasms with lung metastases appeared in 3 rabbits (osteogenic sarcoma) which survived for more than 15 mo.; they showed high enzymatic activity, especially of alkaline phosphatase (approx. 20 Bodansky U, compared to 3-6 in controls). Histogenically, they were associated with young bone marrow connective tissue elements, which did not lose their capacity to differentiate into osteoblasts during malignant degeneration. A significant decrease of Ca, Mg, and P was seen in animals with bone neoplasms.

69-535 PLEURAL REACTION ASSOCIATED WITH ASBESTOS EXPOSURE. (E.) Collins, T. F. B. (Durban Chest Clinic, South Africa). Brit. J. Radiol. 41(489):655-661, 1968.

Routine miniature radiography of 552 men, working under "favorable" conditions in an asbestos-cement factory in Durban, showed obvious pleural reactions in 11/552 (2%), while the incidence among workers not handling asbestos was 0.3-0.6%. These 11 pts. and 4 others are described: all were African males, had worked in the industry 2-5 yr. and all except 2 had no overt symptoms. One pt. had a probable old tuberculous lesion and another had possible tuberculosis. Asbestos bodies in the sputum, clubbing and a positive Heaf tuberculin reaction (II-IV) were present in 8/15, 9/15 and 15/15, resp. It is suggested that the observed pleural lesions are the first signs of disease induced by light exposure to asbestos over a relatively short time. The "acute" (with visible parenchymal disease) and "chronic" (usually symptomless, with dense soft tissue plaques without apparent calcification) asbestosis, corresponding to sustained heavy exposure or light and/or intermittent exposure, are described and illustrated.

69-536 AN EXTRA FUNGAL SOURCE OF AFLATOXINS. (E.) Mishra, S. K. (U. Delhi, India) and H. S. R. Murthy. Curr. Sci. 37(14):406, 1968.

Aflatoxins B and G were demonstrable by thin layer chromatography in a chloroform extract of a *Streptomyces* culture derived originally from the sputum of a pt. with an undiagnosed bronchopulmonary disorder. The acid-fast organism was identified by its morphological and biochemical characteristics and grown on a standard, stationary culture at 37° C for 6 wk. at pH 7.2. When the aflatoxin bands detected by fluorescence under UV light were scraped off and eluted with methanol, UV absorption bands characteristic for aflatoxin was obtained, confirming the presence of intensely fluorescent aflatoxins in the Streptomyces species. The toxin (25 μg in 0.2 ml propylene glycol by inj.) was lethal to white mice within 24-48 hr.; histopathological studies of the liver showed cirrhosis marked by characteristic fatty changes.

69-537 THE STRAIN DIFFERENCE IN THE INDUCTION OF LEUKEMIA BY URETHAN. (E.)
Vesselinovitch, S. D. (Chicago Med. Sch., Ill.)
Cancer Res. 28(9):1674-1676, 1968.

In 2 groups of newborn C3H mice (both sexes) treated i.p. with a 14% soln. of urethan (U) in redistilled water (0.7 mg/g/every 3 days x 3 or 6), leukemia developed in 10/83 and 44/84, resp., at a mean age of 28 wk. and 25 wk., resp. (compared to 0/80 controls at 40 wk.). Comparable tabulations for C57BL mice were 41/84 and 74/90, resp., at a mean age of 21 wk. and 19 wk., resp. (compared to 0/82 controls at 40 wk). Comparable tabulations for (C57BL x C3H)F_1 mice were 21/81 and 60/83, resp., at a mean age of 23 wk. and 21 wk., resp. (compared to 0/84 controls at 40 wk.). There were no significant sex differences in leukemia incidence in any group. A single inj. of U (as above) failed to induce leukemia in any of the 3 strains. In general, C57BL mice appeared to survive U admin. better, gained more wt. during the 40-day observation period and showed a shorter anesthetic effect than C3H mice, although the injurious effect of U on the thymus (cellular pyknosis and karyorrhexis at autopsy) was greater.

See also abstract nos.: 442,444,445,446,447,450,461,462,470,538,557,635,642,645

VIRAL CARCINOGENESIS

Most abstracts in this section are supplied by the National Cancer Institute. Names of the abstractors are presented for each abstract. Unsigned abstracts have been prepared by Medical Literature, Inc.

69-538 ON THE NATURE OF CANCER. AN ANALYSIS FROM CONCEPTS IN CURRENT RESEARCH. PART III. (E.) Richards, V. (Children's Hosp. and Adult Med. Ctr. San Francisco, Calif.). Oncology 22(1):6-35, 1968.

Immunologic aspects of cancer are reviewed, including concepts, methods of analysis and antigens induced by carcinogenic viruses and chemicals. (Dr. M. E. Hodes)

69-539 TUMOR-SPECIFIC TRANSPLANTATION ANTIGENS: G.H.A CLOWES MEMORIAL LECTURE. (E.) Klein, G. (Karolinska Inst., Stockholm). Cancer Res. 28(4):625-635, 1968.

The tumor-specific transplantation antigens are reviewed from a variety of points of view: history, evidence for the immunological nature of tumor-specific rejection response, the role and potential significance of tumor-specific transplantation antigens, tumor-specific transplantation antigens in the phenotype of the neoplastic cell, the immune status of the tumor-bearing host, surveillance and approaches to prevention, and the implication for therapy in man. (Contributor: Dr. J. Donald Hare)

69-540 SUDDEN INCREASE IN SPONTANEOUS TUMORS IN A GOLDEN HAMSTER COLONY. (Ger.) Horn, K. H. (Ger. Acad. Sci., Berlin) and R. Siewert. Acta Biol. Med. German. 20(1):103-110, 1968.

An increasing number of tumors (35 lymphosarcomas; 4 papillomas in 2 animals; 1 adenocarcinoma of the liver, 1 lymphatic-histiocytic leukemia) were observed over 8 mo. in a random-bred colony of golden hamsters which had previously been free of spontaneous tumors. The morphology, localization and histology of the tumors are described (Contributor: Dr. Friedrich Deinhardt)

69-541 GROWTH AND MAINTENANCE OF THE CANINE VENEREAL TUMOUR IN CONTINUOUS CULTURE. (E.) Adams, E. A. (Sch. Vet. Med., Tuskegee Inst., Alabama), L. P. Carter and W. J. Sapp. Cancer Res. 28(4):753-757, 1968.

The spontaneous venereal tumor of dogs, is readily transplantable to susceptible dogs. This tumor has now been established in tissue culture as a stable cell line and has been in continuous culture for over 18 mo. Two morphologically distinct cell types are always evident; spindle reticulum-like elements and round cells. Chromosome number and distribution resemble that of the spontaneous tumor cell.
(Contributor: Dr. J. D. Hare)

69-542 DEVELOPMENT OF MURINE LEUKEMIA AFTER INOCULATION OF HUMAN LYMPHOMAS. (E.) De Pasqualini, C. D. (Acad. Nat. Med., Buenos Aires) and A. Pavlovsky. Cancer Res. 28(4): 788-792, 1968.

Biopsy and/or bone marrow specimens from human lymphomas were inoc. into the spleen of young BALB mice, followed by a blind i.p. passage. Cells from 5 human sources (including hemocytoblastomas, fibrosarcomas, Hodgkin's disease and Burkitt lymphoma cells) induced short-latency leukemias; the incidence of long-latency leukemia was also significantly increased. However, human control specimens (4 normal bone marrow and 1 tonsil material) also increased the incidence of spontaneous long-latency leukemia. These findings suggest that a leukemogenic factor is present in human lymphomas and possibly in normal bone marrow, capable of triggering a pre-existing mechanism in the mouse. (Contributor: Dr. J.D. Hare)

69-543 THE INCIDENCE OF COMPLEMENT FIXING ANTIBODIES TO HERPES SIMPLEX AND HERPES LIKE VIRUSES IN MAN AND RHESUS MONKEYS. (E.) Gerber, P. (N.I.H., Bethesda, Md.) and E. N. Rosenblum. Proc. Soc. Exp. Biol. Med. 128(2):541-546, 1968.

The results of the comparative sero-epidemiology of herpes-like viruses (HLV) and herpes simplex virus infections in man are presented. Sera from 573 subjects of various ages were examined for complement-fixing antibodies, reaching max. frequency of 65% in the 3-5 yr. age group. Both antibodies were present in 85-90% of the adult population and were distributed on a worldwide basis. Both antibodies persisted for at least 10 yr. in sera of 26 normal individuals. By comparison, 50% of sera obtained from 99 rhesus monkeys within 1-4 days after capture contained antibodies reacting with HLV antigen.
(Contributor: Dr. Merle Mizelle)

69-544 THE HYPEREOSINOPHILIC SYNDROMES. (E.) Hardy, W. R. (VA Hosp., Albuquerque, N. M.), R. E. Anderson. Ann. Intern. Med. 68(6): 1220-1229, 1968.

Although eosinophilic leukemia is a recognizable entity and has been associated with the Ph^1 chromosome in at least 1 pt., the authors argue that many cases diagnosed as eosinophilic leukemia are not leukemic at all. Three patients are described with WBC as high as 98,000 (av. 45%, 58% and 82% eosinophils, resp.), who were considered to represent an example of a nonleukemic hypereosinophilic syndrome. One of these pts. had been treated for eosinophilic leukemia without effect. The difficulties and pitfalls in diagnosing leukemia in certain cases indicated in this paper emphasize one of the problems of investigators working on the virus-leukemia problem as it relates to man.
(Contributor: Dr. Paul Levine)

69-545 ONCOLYTIC POTENTIALS OF NONHUMAN VIRUSES FOR HUMAN CANCER. II. EFFECTS OF FIVE VIRUSES ON HETEROTRANSPLANTABLE HUMAN TUMORS. (E.) Yohn, D. S. (U. Pittsburgh, Pa.), W. McD. Hammon, R. W. Atchison, and B. C. Casto. J. Nat. Cancer Inst. 41(2):523-529, 1968.

Five viruses, noninfectious for man, were studied as potential oncolytic agents for human tumors. The infectious bovine rhinotracheitis and equine rhinopnenumonitis viruses were found oncolytic in KB and HeLa cells, resp. (Contributor: Dr. E. Y. Lasfargues)

69-546 BASAL CELL EPITHELIOMA AT SITE AND FOLLOWING SMALLPOX VACCINATION. (E.) Zelickson, A. S. (U. Minnesota Med. Sch., Minneapolis). Arch. Derm. (Chicago) 8(1):35-36, 1968.

A 51-yr.-old man who had been vaccinated many yr. previously without complications received another smallpox vaccination, but the vaccination site never healed and was treated unsuccessfully with compresses, topical and systemic antibiotics and topical corticosteroids. An exudative nodule, confined to the vaccination site, progressed slowly for 11 mo. after vaccination, when biopsy showed a typical ulcerated basal cell carcinoma. Axillary nodes were not enlarged. A few cases (number not stated) of malignant tumors in vaccination scars are known, but the latent period was usually very long (20-30 yr., although 1 pt. showed a 1-yr. latent period). It is concluded that any unusual change in a vaccination scar should be suspected as malignant.

69-547 SEROLOGIC BEHAVIOR OF PATIENTS WITH MALIGNANT TUMORS OF THE ORAL CAVITY. (It.) Guasta, G. (U. Turin, Italy). Minerva Stomat. 17(6):602-608, 1968.

Blood coagulation Factor X (Stuart-Prower factor) was determined in the sera of 5 men and 2 women (age 42-84) with adenocarcinoma of the parotid (1) or carcinoma of the pharynx (1), gingiva (2) or tongue (3), forming metastases and causing widespread destruction of the facial soft tissues. The reaction of Factor X with the RNA (antigen) of foot-and-mouth disease virus depended on disease progression; in 5 pts., rapid progression of the disease was accompanied both by a decrease in serum Factor X levels and its reactivity with viral RNA. In 2 pts., clinical improvement following radiotherapy was accompanied by an increase in Factor X; in 1 pt. whose disease remained stationary for a time, Factor X levels remained low but stable.

69-548 SEARCH FOR VIRUSES IN CHILDHOOD LEUKEMIA AND RHABDOMYOSARCOMA. (E.) Smith, J. W. (U. Tennessee Med. Units, Memphis), A. I. Freeman and D. Pinkel. Bibl. Haemat. 30:316-318, 1968.

Electron microscopy of bone marrow from 95 children with leukemia failed to reveal virus or virus-like particles, but virus-like particles were seen occasionally in 2/9 thymus and 2/14 spleen specimens. Electron microscopic examination of 14 monolayer cultures of bone marrow from children with leukemia revealed occasional electron-dense structures (approx. 100 mμ in diameter) near the nuclear membrane in 1 culture. Although morphologically similar to fully-formed myxovirus particles, these particles were not localized at the cell membrane or along the endoplasmic cisternae as are myxoviruses. Primary human amnion cultures and serial cultures of monkey kidney cells were inoc. with bone marrow plasma, blood plasma and cerebrospinal fluid from 43 children with leukemia. Myxovirus-like cytoplasmic particles were observed in 4 cultures of plasma-inoc. amnion cells, but were not seen in further passages; no instances of cytopathic or transforming effects were noted in the inoc. cultures. Peripheral blood neutrophils 4/85 children with leukemia showed cytoplasmic fluorescence with Moloney and Rous leukemia virus antisera, but examination by indirect immunofluorescence was consistently negative. Ultrastructural studies of 1 of these specimens revealed electron-dense cytoplasmic particles (2-5 mμ in diameter) in the neutrophils. Their nature could not be determined; they do not seem to be ribosomes or glycogen. Amnion and monkey kidney cultures inoc. with these cells showed no virus or virus-like particles by electron microscopy. No virus-like particles were seen by electron microscopy in 8 of the 9 specimens of rhabdomyosarcoma from 6 children or 4 monolayer cultures of this tumor. Examination of an autopsy tumor specimen from 1 of these pts. showed electron-dense, double-membraned structures resembling myxoviruses.

69-549 LYMPHOPOIESIS IN LONG-TERM CULTURES OF HUMAN LYMPH NODES. (E.) Pontén, J. (U. Uppsala, Sweden). Bibl. Haemat. 30:319-321, 1968.

Usually, explantation of human lymph node in tissue culture results in the release of lymphoid cells in decreasing numbers for 2-4 wk.; after about 2 wk., fibroblasts are produced in relatively increasing numbers, displacing the decreasing primary production of lymphoid elements. Under certain conditions (not stated), when the primary explant was kept intact, a secondary production of lymphoid cells was observed 2-4 mo. after initiation of the culture. The culture method has been further modified (not described) to maintain intact pieces of lymphoid tissue for very long periods. With this modified method, 2 additional "transformations" were observed in lymph nodes from pts. with Hodgkin's disease. Non-malignant lymph nodes also showed a similar secondary lymphopoiesis, which provides an opportunity to study differentiation and immunoglobulin synthesis in a closed and stable system. In line 61M (Hodgkin's disease), analysis by immunodiffusion, immunoelectrophoresis, autoradiography and agarose electrophoresis with immunodiffusion (using specific rabbit antisera) revealed that 61M cultures produced IgG globulin exclusively. Crude fractionation and studies with fluorescent antibodies indicated that small lympho- or plasmablast- like elements were responsible for immunoglobulin synthesis, rather than larger and more immature-looking cells. No detectable immunoglobin synthesis was seen before the phase of secondary lymphopoiesis. Preliminary results indicated the production of an identical "clone" of IgG in 2 additional cases of Hodgkin's disease, while 3 non-malignant lymph nodes after lymphoblastoid transformation, produced either IgA and IgG. "Clonal" production of IgG globulin may be carried out by a cell clone derived from a single ancestor.

69-550 STUDIES OF THE HERPES-TYPE VIRUS ASSOCIATED WITH A BURKITT LYMPHOMA CELL LINE. (E.) Grace, J. T., Jr. (Roswell Park Mem. Inst., Buffalo, N. Y.), Y. Hinuma, J. Horoszewicz, V. Dunkel, M. Konn, and Yamaguchi, J. Bibl. Haemat. 30:312-315, 1968.

The P3J clone of Burkitt lymphoma cells produced high titers of a herpes-like virus (HLV), which caused lysis in Raji (Burkitt lymphoma) and #64-10 (human leukemic myeloblasts) cells after 3-4 days. This infection was productive in both cell lines; immunofluorescence showed infection beginning in the nucleus and spreading to the cell membranes. Electron microscopy showed a full range of HLV particles, from empty capsids to mature, encapsulated particles on the cell surface. Intracerebral inoc. of HLV into newborn kittens produced an encephalitis-like syndrome in about 50% of the animals. Some of the survivors and some animals that failed to develop CNS symptoms later developed a wasting disease syndrome. A few of these animals also showed infiltration of the lymph nodes and viscera by immature reticulum cells; this syndrome may or may not be malignant.

69-551 METHOD FOR CULTURE OF THE BURKITT HERPES-TYPE VIRUS AND THE ANTIGENIC IDENTITY OF THREE LINES ISOLATED. (E.) Stewart, S. E. (NCI, Bethesda, Md.), D. E. Glazer, M. I. Stevenson and B. J. Lloyd, Jr. Bibl. Haemat. 30:303-311, 1968.

The herpes-type virus was isolated from the SL-1 Burkitt lymphoma cell line by intracerebral (i.c.) inoc. of newborn, thymectomized hamsters with a cell-free conc. of pooled supernatant fluids extracted from infected brain. The hamster brain passage virus (HBPV/SL-1) could not be cultivated in monolayers from several species of animals. When i.c. inoc. animals developed CNS symptoms, the brains were removed and passaged to other animals using cell-free brain extract or a 10% brain homogenate. The cultures prepared and tested were: (1) suspension cultures of infected hamster brains grown in a special medium (composition given); (2) suspension cultures from normal uninfected brains, inoc. with HBPV/SL and grown in the special medium; (3) similar cultures of fetal human; (4) normal human lymphoblast suspension cultures inoc with HBPV/SL-15 (5) suspension cultures inoc. with Burkitt tumor cells known to carry herpes-type virus; and (6) normal hamster brain and minced rabbit embryo suspension cultures (prepared in a similar manner) inoc. with P_3J Burkitt tumor cells. All cultures were tested in animals by i.c. inoc. Cultures 2, 3 and 4 were inoc. with a 10% brain cell-free extract. The supernatant fluid from HBPV-infected hamster brain suspensions (# 1) could not be titrated beyond 10^{-3} when inoc. i.c. into thymectomized newborn hamsters, but after more than 90 passages, HBPV killed newborn hamsters after i.p. inoc. Infectivity of HPBV for normal human brain and normal hamster brain suspension cultures (culture #2) was good, the incub. period for the human cultures being about double that for the hamster culture. Control normal human lymphocyte cultures were free of virus after 7 mo. of subculture, whereas cultures (type #3) inoc. with HBPV were still infectious in subculture and showed CPE, although the supernatant fluid showed no infectivity in hamsters. The P_3J virus (culture #4) produced the same CNS symptoms in hamsters as HBPV. The infectivity of P_3J in rabbits increased with passaging causing death 3-4 days after i.c. or i.p. inoc. The herpes-type viruses HBPV/SL-1, P_3J and a third designated as L, investigated by in vivo neutralization tests, were antigenically identical.

69-552 STUDIES OF ANTI-"C-TYPE PARTICLE" FLUORESCENT ANTIBODY IN HUMAN LEUKEMIA: A STATUS REPORT. (E.) Fink, M. A. (NCI, Bethesda, Md.). Bibl. Haemat. 30:322-325, 1968.

Reactions of human cells with antisera to leukemia virus are summarized from previously published reports. No immunofluorescent cells have been demonstrated in bone marrow of normal individuals and cells from pts. with lymphoma diseases react only rarely; conversely, some leukemic marrows contain no immunofluorescent cells. Absorption of fluorescent antibody with equal vol. of packed peripheral WBC from 14 normal individuals did not reduce immunofluorescent staining. Whereas immunofluorescence was found predominantly in younger cells, only a portion (often, only a few) of these cells in the same stage of development will react. Frankly blastic cells from a tissue culture line of human leukemic lymphoblasts, examined repeatedly at various intervals after culture, never showed either positive immunofluorescence or virus particles (under the electron microscope).

69-553 EFFECTS OF RIBONUCLEIC ACID (MESSENGER AND TRANSFER FRACTIONS) FROM LEUKEMIC

BONE MARROW ON FIBROBLAST CULTURES IN VITRO. (It.) Pisano, E. (U. Cagliari, Italy), P. Zizi, S. Iannelli, G. Corda, M. T. Petrini and F. Adamo. Rass. Med. Sarda 71(2):265-274, 1968.

Messenger RNA (mRNA) and transfer RNA (tRNA) from leukemic bone marrow and lymphatic tissues were added to tissue cultures of chick fibroblasts (0.5 μg/ml); cultures without added RNA and those with added normal mRNA served as controls. The mitotic index and mitotic phases were studied after 14-48 hr. Cultures treated with normal mRNA resembled the untreated control cultures except for a slight, transitory cytoplasmic vacuolization and a slight decrease in the mitotic index at 14 hr. These very moderate changes were also noted in the cultures treated with leukemic tRNA. Cultures treated with leukemic mRNA showed morphological and reproductive alterations, relatively constant in different tests, including intense vacuolization, loss of cellular boundaries, anomalous mitoses (such as tripolar and fragmentation figures) and giant multinucleate forms. These abberations decreased with time; at 38 and 48 hr., cultures treated with leukemic mRNA again resembled the untreated controls in all respects.

69-554 COMPARATIVE STATISTICAL STUDIES ON THE GEOGRAPHICAL DISTRIBUTION OF HUMAN AND BOVINE LEUKEMIA IN SWEDEN. (E.) Henricson, B. (Karolinska Inst. Sch. Med., Stockholm) and N. Ringertz. Bibl. Haemat. 30:331-332, 1968.

During the last 10 yr., the frequency of bovine leukemia has become stabilized at about 1.5 cases/1000 cows in Sweden; in the southeastern counties, where the frequency is more than double the national av., the trend toward a lower incidence has occurred only in the last 5 yr. Human leukemia tended to increase from 1941 to 1964, when the mortality was nearly 9/100,000 population. In 7 counties with a high incidence of bovine leukemia, the human leukemia mortality rate did not vary from the national av. during the 1940's and 1950's; however, after 1960 the frequencies of both bovine and human leukemia rose significantly above the national av. in 3/7 counties. In Kalmar county, with a very high frequency of bovine leukemia, no significant difference was found in the frequency of human leukemia from the national rate in 1958-1963; no significant differences were found among the rural areas and between villages and rural areas. A positive, significant correlation was seen between bovine leukemia and the number of cows per unit of cultivated land area. No such correlation could be found for human leukemia and no correlation existed between the frequencies of human and bovine leukemia within the communities.

69-555 A TOPOGRAPHICAL STUDY OF LEUKEMIA IN MAN AND CATTLE IN DENMARK. (E.) Jensen, N. K. (Danish Anti-Cancer League, Copenhagen). Bibl. Haemat. 30:326-330, 1968.

Danish Cancer Registry data from 1943-1959 on the incidence of leukemia and lymphoma (including myeloma and Hodgkin's disease) in urban and rural areas of Denmark (Copenhagen excluded) were compared to data on the incidence of bovine leukosis. The number of "leukosis herds" was significantly increased in 4/24 counties reported (41-84 herds, compared to 18-34 herds in 2 counties, 3-5 in 5 counties, 1-2 in 10 counties and none in 3 counties). In these high-leukosis rural areas, the incidence of human leukemia and lymphoma was 51.8/million in children under 14, 78.4 in women (age 15-59) and 102.6 in men (age 15-59), compared to 46.1, 78.4 and 111.9, resp., in the low-bovine leukosis areas. These differences were not significant. It is concluded that the incidence of human leukemia varies independently of the incidence of bovine leukemia.

69-556 NEW STRAIN OF VIRAL LEUKOSIS (RETICULOSARCOMATOSIS) INDUCED IN MICE WITH HUMAN LEUKEMIC MATERIAL. (E.) Bergolz, V. M. (Oncol. Inst., Moscow). Bibl. Haemat. 30:343-346, 1968.

Normal human spleen cultures infected with a spleen and bone marrow suspensions from a man with acute leukemia (incub. 4 or 7 days at 37° C), inj. into the spleens of 3-mo.-old CC57br mice (low-leukemia strain), induced reticulum cell sarcoma (RCS) in 9/24 of the 10-mo. survivors. A spleen suspension from 1 mouse with myelosis induced by cell transplantation was added to a fresh culture of normal CC57br mouse spleen; after 3 passages at 37° C (1.5 mo.), a centrifugate from an 8-day-old culture was admin. i.p. to 20-day-old CC57br mice, inducing leukemia in 2/3 survivors after a 22.5-mo. latent period. Transplantation of RCS cells from 1 mouse induced RCS after 4-5 mo. in recipient mice (same strain); cells from these mice induced RCS after less than 30 days. The leukemia was transplantable in CC57br and C57bl mice with a 21-day latent period. Cell-free preparations from liver, spleen and tumor tissue of mice after 4 transplant generations of the RCS induced similar tumors in newborn CC57br mice after 1 mo. or more.

69-557 SIGNIFICANCE OF ADJUVANT-INDUCED PLASMACYTOMAS OF MICE IN RELATION TO THE PATHOGENESIS OF HUMAN MULTIPLE MYELOMA. (E.) Azar, H. A. (Columbia U. Coll. Phys. Surgs., New York City.). Ann. Allerg. 26(6):293-298, 1968.

In BALB/c mice, i.p. inj. of mineral oil (no other details) induced an acute inflammatory reaction within a few days (neutrophils and mononuclear phagocytes, no plasma cells or lymphocytes). After 1-2 mo., serum γ-globulin rose and the peritoneal cavity contained granulomatous foci with clusters of lymphocytes, plasma cells and mononuclear phagocytes. Plasma cell tumors appeared and serum immunoglobulins increased sharply 6 mo.-2 yr. later, and virus-like particles (70 mμ in diameter), corresponding to Bernhard type A particles were seen within the cisternae of the endoplasmic reticulum. To determine whether plasmacytosis in man could evolve into plasmacytoma or multiple myeloma, 25 consecutively autopsied cases of diffuse (non-myelomatous) plasmacytosis with dysproteinemia were compared to 65 consecutively autopsied cases of osteolytic multiple myeloma. The conditions associated more often with plasmacytosis than myeloma were rheumatic diseases (3/25 and 0/65, resp.), chronic lung diseases (4 and 0, resp.); chronic pyelonephritis (4 and 2, resp.); syphilis (3 and 2, resp.), miscellaneous chronic infections (5 and 3; resp.), liver cirrhosis (4 and 1, resp.); polycythemia vera (1 and 0, resp.), leukemia (1 and 0, resp.); carcinoma (11 and 6, resp.; lung 2 and 2, colon 2 and 0, breast 3 and 2, tonsils 2 and 0, prostate 2 and 1, small intestine carcinoid 0 and 1, resp.). In pts. with multiple myeloma associated with a chronic inflammatory process, myeloma nodules were absent in the area of inflammation and the plasma cell tumors seemed to arise independently of any obvious inflammatory process. No virus-like particles were seen in human myeloma cells.

69-558 RECENT STUDIES ON LEUKEMIA AND SOLID TUMORS IN MICE AND MAN. (E.) Dmochowski, L. (Texas Medical Ctr., Houston.). Bibl. Haemat. 30:285-298, 1968.

The present status of research is discussed, predominantly on the basis of the author's published reports (53 references). Type C mouse leukemia virus particles have been demonstrated in organs and tissues from mice with Hodgkin's-like reticulum cell sarcoma or with autoimmune disease. Similar particles have also been demonstrated in several tumors induced by a mutant of the Moloney mouse leukemia virus (the Harvey mouse sarcoma virus). Examination of 279 tissue culture specimens (mostly from bone marrow, some from buffy coat and/or lymph nodes) from pts. with acute or chronic lymphatic or granulocytic leukemia, unclassified leukemia, malignant lymphoma or Hodgkin's disease, and from parents of children with leukemia, showed no herpes-like particles in any case. Type C-like particles were found in 30/157 leukemia cultures and PPLO-like structures in 33/157, from 24/109 and 27/109 pts., resp. Examination of cultures from 47 pts. with Hodgkin's disease showed virus-like particles in 2/63 cultures and PPLO-like structures in 4/63 (from 2 and 4 pts., resp.), compared to 21/98 and 17/98 cultures, resp., from 17/62 and 17/62 pts., resp., with other types of lymphoma.

69-559 EXPERIMENTAL TRANSMISSION OF CANINE MALIGNANT LYMPHOMA TO THE BEAGLE NEONATE. (E.) Kakuk, T. J. (Michigan State U., East Lansing), R. W. Hinz, R. F. Langham and G. H. Connor. Cancer Res. 28(4):716-723, 1968.

Two serial passages of canine malignant lymphoma (CML) were accomplished in 2 litters of newborn beagle puppies with suspensions of viable CML cells. CML developed in 3/15 dogs inoc. with a single dose of either a cell suspension or a cell-free extract; 2/3 with overwhelming CML were preirradiated while 1/3 was not X-irradiated. Malignant lymphoma did not occur in the third serial passage, although evidence of lymphoid hyperplasia was found. Electron microscopic examination revealed intracytoplasmic structures consisting of individual particles measuring 18-22 mμ in diameter. (Dr. J. Donald Hare)

69-560 EXPLOITATION OF EPIDEMIOLOGIC ASPECTS OF MALIGNANT LYMPHOMA. (E.) Cohen, D. (U. Pennsylvania Sch. Vet. Med., Philadelphia.). Bibl. Haemat. 30:268-270, 1968.

Of 14,334 dogs admitted to a veterinary clinic between 1963-1966, 74 (5.16/1000) had malignant lymphoma. Boxers accounted for only 3.9% of the total clinic population, but 16/74 (21.6%) of the dogs with lymphoma were boxers. The breed-specific lymphoma incidence was 28.5/1000 in boxers (compared to 11.9 in 1951-1962) and 4.2/1000 in all other breeds; this increase in lymphoma incidence was attributed to the decreasing popularity of boxers (8.8% of the clinic population in 1955 and 3.5% in 1965) and the consequent increased age of the boxers by comparison to other dogs; about 20% of the boxers were over 10 yr. and only 10.3% were under 1 yr. old, compared to 10% and about 32%, resp., in the entire group. Canine lymphoma and osteosarcoma, unlike other canine tumors (including the virus-induced mastocytoma), show a marked peak of distribution at age 7-9 yr. The establishment of a high-risk colony of boxers for the study of tumor viruses and other carcinogens (and comparison to a low-risk colony of beagles) is suggested.

69-561 INCIDENCE OF CANINE LYMPHOID LEUKOSIS: AGE, SEX AND BREED DISTRIBUTION; RESULTS OF A NECROPSIC SURVEY. (E.) Parodi, A. (Nat. Veterinary Sch., d'Alfort, France), M. Wyers and J. Paris. Bibl. Haemat. 30:263-267, 1968.

Examination of 3546 canine autopsy reports from 1961-1966 at the Alfort Veterinary School in Paris revealed 52 cases of lymphoid leukosis (27 male, 17 female; sex not stated in 8), representing 1.4% of the autopsy series and 0.13% of the 38,788 dogs examined clinically. Analysis of age distribution showed the highest incidence at 6 and 7 yr. (mean age 7.1 yr.). There was no significant difference in sex and breed distribution between dogs with and without leukosis. It appeared, however, that boxers (3/52), poodles (5/52), chows (1/52) and shepherd breeds (21/52) were over-represented, while dachshunds (0/52) and spaniels (2/52) were under-represented, by comparison to the total autopsy series.

69-562 TRANSMISSION AND ELECTRON MICROSCOPY OF LYMPHOCYTIC LEUKEMIA IN THE CAT. (E.) Rickard, C. G. (Cornell U., Ithaca, N. Y.), J. H. Gillespie, K. M. Lee, F. Noronha, J. E. Post, and E. L. Savage. Bibl. Haemat. 30:282-284, 1968.

The first successful transmission employed tissues from a 1-yr.-old male Siamese cat with an anterior mediastinal lymphosarcoma at the site of the thymus gland. A suspension of the tumor and blood, inoc. i.p. into 3 kittens (3 days old), induced similar fatal lymphosarcomas after 9-12 mo. in 3/3. Autopsy findings in each animal included large tumors in the anterior mediastinal space and involvement of the liver, spleen, mesenteric and other lymph nodes and bone marrow. It is doubtful that transmission resulted from transplantation of the donor cells, because (1) the recipient kittens were unrelated genetically to the donor cat; (2) the latent periods before evidence of transmission were long; and (3) the donor cat was male and 1 recipient was a female with sex chromatin-positive tumor cells, suggesting induction of the tumor. Electron microscopic studies of tumors from 2 cats with spontaneous lymphocytic leukemia revealed virus particles identical to the C-type virus particles of mouse leukemia. Both cats had peripheral lymphocytic leukemia and typical widespread organ infiltration. In both cats, the tumor tissues contained scattered particles (sometimes a clump of 2 or 3 particles), mostly in intercellular spaces; none was seen free in the cytoplasm or nucleus, although a few were seen in cytoplasmic vesicles. The typical particle (av. diameter about 110 mμ) contained a nucleoid of moderate electron density in the center with a margin of high density; around the nucleoid was an electron lucent space in turn surrounded by a distinct limiting membrane of the particle. Budding was also observed. Similar virus particles and buds were present in tissue cultures of the tumor after 3 passages. Cell-free centrifugates from thymic tumor tissue of 1 cat, inoc. into 2-3-day-old kittens, induced fatal generalized lymphadenopathy changes within 30-42 days in 4/24 animals; histological changes suggested preleukemic lesions. Electron microscopy of the lymph nodes and bone marrow revealed large numbers of C-type virus particles and buds.

69-563 ADVANCES IN FELINE LEUKEMIA. (E.) Jarrett, O. (U. Glasgow, Scotland), H. M. Laird, G. W. Crighton, W. F. H. Jarrett and D. Hay. Bibl. Haemat. 30:244-254, 1968.

A total of 48 cases of spontaneous lymphosarcoma in cats were classified according to distribution of lesions (14 multicentric, 5 thymic, 24 alimentary and 5 unclassified types). There was no difference in sex and age distribution, compared to the cat population admitted to the hospital (no other details). In 3/4 cases of confirmed lymphosarcoma, electron microscopy of the tissues revealed particles resembling murine leukemia viruses and viruses of the avian leukosis complex. They were approx. 100 mμ in diameter, spherical or elliptical with an internal electron-dense membrane 60 mμ in diameter and an intermediate membrane, both spherical or elliptical in section. They were found free near the cell surface, in intracellular vacuoles and budding from the cell membrane into intracellular space or intracytoplasmic vacuoles. Cell-free lymph node extracts from 1 of the virus-positive cases were inoc. i.p. (1.0 ml) into random-bred kittens. Particles were observed in blood platelets 4 wk. later and every 14 days thereafter. At the time of report 6/15 kittens had been autopsied, showing histological abnormalities in the spleen, lymph nodes and bone marrow; 1 of the kittens also showed severe clinical signs of lymphosarcoma (confirmed alimentary type with bone marrow involvement). The particles were found most frequently associated with megakaryocytes which were highly vacuolated, each vacuole containing 1 or more particles.

69-564 ENHANCEMENT BY THYMECTOMY OF TUMOR FORMATION BY ONCOGENIC ADENOVIRUSES. (E.) Van Hoosier, G. L. (Baylor U. Coll. Med., Houston, Tex.), C. Gist and J. J. Trentin. Proc. Soc. Exp. Biol. Med. 128(2):467-469, 1968.

Adenoviral serotypes 1,7,8,14,21, and 24 were inoc. into thymectomized and nonthymectomized newborn Syrian hamsters to test their oncogenicity in an initial screening program. Although the number of animals thymectomized on day 0 and inoc. with type 7 was small, thymectomy at day 7 appeared about equally effective. Thymectomy enhanced the tumor incidence with adenovirus types 7 and 21. (Dr. Merle Mizelle)

69-565 VIRUS AND DNA SYNTHESIS IN X-IRRADIATED HUMAN KIDNEY CELL CULTURES EXPOSED TO ADENOVIRUS TYPE 12. (E.) Harnois, M. (U. Pittsburgh, Pa.) and M. Ho. Proc. Soc. Exp. Biol. Med. 128(3):651-654, 1968.

DNA synthesis in human kidney cell cultures was prevented by X-irradiation, but did not affect the replication of polyoma virus. Adenovirus type 12 replicated in irradiated cells as well as unirradiated cells. Virus production was preceded and accompanied by a marked increase in cells showing DNA synthesis in the nucleus (monitored by autoradiography), which may be virus and/or virus-stimulated cell DNA. (Dr. Merle Mizelle)

69-566 INHIBITION OF ADENOVIRUS 12 ONCOGENICITY BY ADENO-ASSOCIATED VIRUS. (E.) Kirschstein, R. (NIH, Bethesda, Md.), K. O. Smith and E. Peters. Proc. Soc. Exp. Biol. Med. 128(3):670-673, 1968.

The small virus-like particles called adeno-associated virus (AAV) partially inhibited oncogenesis by adenovirus 12 when both were inoc. together. The tumor incidence in the group receiving only adenovirus 12 was more than double that in the group receiving adenovirus 12 + AAV; the tumors appeared earlier in animals receiving the adenovirus 12 alone. No morphological differences between the tumors in each group were noted. (Dr. Merle Mizelle)

69-567 TUMOR INDUCTION BY SIMIAN ADENOVIRUS 30 AND ESTABLISHMENT OF TUMOR CELL LINES. (E.) Slifkin, M. (Allegheny Gen. Hosp., Pittsburgh, Pa.), L. Merkow and N. P. Rapoza. Cancer Res. 28(6):1173-1179, 1968.

Simian adenovirus 30 induced locally invasive neoplasms at the site of s.c. inoc. in 2% of a group of hamsters. SV30 T antigen was demonstrated in SV30 tumors but no SV40 tumor antigen was found. Transplantable tumors were developed, but the ability of the tumor to grow in vitro varied markedly. Infectious SV30 virus was not recoverable from either the primary tumors or tissue cultured tumor cells. (Dr. J. Donald Hare)

69-568 THE HISTOPATHOLOGY AND ULTRASTRUCTURE OF TUMORS INDUCED BY SIMIAN ADENOVIRUS 30. (E.) Merkow, L. (Allegheny Gen. Hosp., Pittsburgh, Pa.), M. Slifkin, M. Pardo and N. P. Rapoza. Cancer Res. 28(6):1180-1190, 1968.

Neoplasms induced by SV30 appeared to have noticeable distinctions from those induced by SV40. Virus-like particles (av. diameter 80 mμ) were observed in the neoplastic cells and showed budding from the endoplasmic reticulum. (Dr. J. Donald Hare)

69-569 PRESENCE OF ANTIBODIES TO SIMIAN VIRUS 40 (SV40) T ANTIGEN IN RHESUS MONKEYS INFECTED EXPERIMENTALLY OR NATURALLY WITH SV40. (E.) Shah, K. V. (Johns Hopkins U., Baltimore, Md.) and D. M. Hess. Proc. Soc. Exp. Biol. Med. 128(2):480-485, 1968.

All of 16 rhesus monkeys infected with SV40 by intranasal (i.n.), s.c. or intragastric (i.g.) inoc. developed neutralizing antibodies by 3 wk. after inoc.; 10/10 animals infected by the s.c. or i.g. route and a majority of those by the i.n. route were viremic. Viremia titers were higher in the group inoc. s.c. The T antibodies developed in all but 2 in the i.n. inoc. group. The T antibodies appeared earlier, reached higher peaks and persisted longer after s.c. inoc. compared to i.n. inoc. The T antibodies were also detected in a proportion of naturally infected monkeys. This proportion was highest (85%) in 1-2-yr. old monkeys and declined with increasing age. (Dr. Merle Mizelle)

69-570 BEHAVIOR OF ENZYME SYSTEMS IN KIDNEY CELLS OF CERCOPITHECUS AND RHESUS MONKEYS RESULTING FROM THE ACTION OF SV40 VIRUS. (It.) De Barbieri, A. (Serum Inst., Milan, Italy), G. C. Tassi, G. Giacometti and M. E. Scevola. G. Mal. Infett. 20(2):200-202, 1968.

The action of SV40 on 17 enzymes and enzyme systems was studied in cultures of cercopithecus (CMK) and rhesus monkey kidney cells (RMK). These 2 cultures showed different behaviors after SV40 inoc. SV40 had a distinct CPE in CMK cells, whereas in RMK cells the virus multiplied slowly with an appreciable morphologic change. Enzymatic activities were measured after 24-96 hr. in CMK cultures and 48-188 hr. in RMK cultures, after standard inoc. with SV40. ATPase and DNase showed no change from uninfected controls in either culture. Significant inhibition of oxidative activity and a parallel increase in glycolysis, kinase activity and the pentose phosphate cycle were seen, as clearly shown by the increased activities of glucose-6-phosphate dehydrogenase and of 6-phosphogluconate reductase. The activities of transketolases and transaldolases indicated a tendency toward shunt oxidation, directed to the production of ribose-5-phosphate. Nuclease activity was different in the 2 cell types; proteolytic activity was inhibited in CMK cells and increased by 40% in RMK cells (compared to normal uninfected preparations).

69-571 ELECTRON MICROSCOPIC OBSERVATIONS ON THE INTERACTION OF MACROPHAGES AND LYMPHOCYTES IN A VIRUS-INDUCED MURINE LYMPHOMA. (E.) Szakacs, A. (U. Texas, M.D. Anderson Hosp., Houston), J. G. Sinkovics, J. J. Butler, B. M. Levy, and C. F. Tessmer. J. Infect. Dis. 118(3): 240-252, 1968.

A mouse lymphoma, induced by tissue culture passaged Rauscher leukemia virus and maintained by serial transplantation in mice, was studied with the electron microscope. Histologically, the lymphoma showed immature lymphoid cells and large histiocytes (the "starry sky" pattern). Typical mouse leukemia virus particles were seen in the starry sky areas; they were formed by histiocytes and cytoplasmolysis and nucleolysis of the lymphoid cells. Virus-containing debris of these cells was phagocytized by macrophages. This histological pattern may be characteristic of lymphomas with histoincompatibility between host and malignant cells. (Dr. V. V. Bergs)

69-572 ENHANCEMENT OF FRIEND AND RAUSCHER LEUKEMIA VIRUS REPLICATION IN MICE BY GUAROA VIRUS. (E.) Turner, W. (N.C.I., Bethesda, Md.), M. A. Chirigos and D. Scott. Cancer Res. 28(6):1064-1073, 1968.

The effects of Guaroa virus (a member of the

Bunyamwere group of arboviruses with physical and chemical characteristics similar to murine leukemogenic viruses) on leukemia virus replication were studied. Preinfection with Guaroa virus markedly enhanced the replication of Friend and Rauscher leukemia viruses, as determined by 3 parameters (splenomegaly, spleen focus formation and virus titer as determined by bioassay). Relationships of the observed viral enhancement with other reported virus systems exhibiting enhancement are discussed. (Dr. J. Donald Hare)

69-573 PLASMA CELL LEUKEMIA IN BALB/c MICE INOCULATED WITH SUBCELLULAR MATERIAL. I. INCIDENCE AND MORPHOLOGY. (E.) Ebbesen, P. (U. Copenhagen, Denmark), R. Rask-Nielsen and K. R. McIntire. J. Nat. Cancer Inst. 41(2): 473-493, 1968.

Plasma cell leukemias were induced in BALB/c mice with an agent from (CBA x DBA/2)F_1 mice carrying transplantable reticular neoplasms. The progeny of the inoc. BALB/c females also showed an increased incidence of neoplasia. Addition of liver tissue extract with hepatitis agent caused a greater increase in leukemia than the leukemogenic agent alone. The leukemias developed late in life, at about 15 mo. (Dr. E. Y. Lasfargues)

69-574 THE H-2 LOCUS AND VIRAL LEUKEMOGENESIS AS STUDIED IN CONGENIC STRAINS OF MICE. (E.) Tennant, J. R. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.) and G. D. Snell. J. Nat. Cancer Inst. 41(2):597-604, 1968.

By use of congenic resistant strains of mice which differ only at single histocompatibility loci, the effect of histocompatibility-2 (H-2) on leukemogenesis by the BALB/Tennant-leukemia virus was investigated. The most favorable allele was H-2^d, in which the virus originated. The least favorable allele was H-2^b; H-2^a and H-2^k occupied intermediate positions. However, in a cross between 2 H-2^k strains, resistance was dominant. (Dr. E. Y. Lasfargues)

69-575 STUDIES ON THE NEUTRALIZATION OF THE ONCOGENICITY OF FRIEND, MOLONEY, AND RAUSCHER VIRUSES. (E.) McCoy, J. L. (Microbiol. Ass. Inc., Bethesda, Md.), A. Fefer and J. P. Glynn. Cancer Res. 28(5):942-946, 1968.

Friend, Moloney and Rauscher (FMR) viruses were incub. with either normal serum or with sera from C57BL/6 mice immunized with syngeneic Friend, Moloney, or Rauscher virus-induced lymphomas. The mixtures were inoc. into newborn BALB/c mice and the development of lymphomas was followed. The oncogenicity of all viruses was neutralized by each of the antisera. The results suggest that FMR viruses possess similar if not identical, antigens. A specific rat anti-Gross serum was also active against the 3 viruses, suggesting the existence of a virion coat component antigenically shared by Gross virus and the FMR viruses. Sera from C57BL/6 mice with regressed autochthonous Moloney sarcoma virus-induced tumors also neutralized the FMR viruses. (Dr. J. Donald Hare)

69-576 ANTILYMPHOCYTE SERUM. (E.) Hirsch, M. S. (Nat. Communicable Dis. Ctr., Atlanta, Ga.). Ann. Intern. Med. 68(5):1134, 1968.

This brief but pertinent commentary on the ability of ALS to depress cellular immune mechanisms emphasizes the increasing susceptibility to viral infections in animals. The current references include studies with Rauscher and Moloney leukemia viruses. (Dr. Paul Levine)

69-577 INCREASED ONCOGENICITY OF THE MURINE SARCOMA VIRUS (MOLONEY) BY CO-INFECTION WITH MURINE LEUKEMIA VIRUSES. (E.) Chirigos, M. A. (NCI, Bethesda, Md.), K. Perk, W. Turner, B. Burka and M. Gomez. Cancer Res. 28(6): 1055-1063, 1968.

The high incidence of spontaneous regressions of primary tumors induced by the Moloney sarcoma virus in adult mice was significantly altered by coinfection with Rauscher, Moloney and Friend leukemia viruses; i.m., i.p. or s.c. inoc. of extracts from progressively growing sarcomas from dually infected animals resulted in extensive metastases. Tumor nodules were observed in several tissues and organs. Regression of primary virus-induced tumors could be altered by low conc. of Rauscher leukemia virus. The role of the leukemia virus, acting as a "helper" or as an immunosuppresser, is discussed. (Dr. J. Donald Hare)

69-578 PATHOGENESIS OF A RHABDOMYOSARCOMA (UNDIFFERENTIATED TYPE) IN RATS INDUCED BY A MURINE SARCOMA VIRUS (MOLONEY). (E.) Perk, K. (NCI, Bethesda, Md.), D. A. Shachat and J. B. Moloney. Cancer Res. 28(6):1197-1206, 1968.

Moloney sarcoma virus of mouse origin induced progressively growing local sarcomas in newborn Osborne-Mendel rats. Cell-free extracts prepared from the rat sarcomas were oncogenic in newborn mice and in newborn, 2-wk. and 4-wk.-old rats. The sarcomas were readily transplantable in this rat strain. Tumors in the early transplant generations tended to regress, while tumors transplanted for 8 or more generations grew progressively. The primary or transplanted rat sarcomas, in contrast to those induced in the mouse, consistently metastasized to the draining lymph nodes and lungs. Histologically the tumors were extremely cellular and composed of undifferentiated rhabdomyoblast-like cells containing abundant cytoplasmic fibrils and an occasional typical Z band. The tumor at the site of inoc. and in the metastatic areas showed virus formation and the particles were indistinguishable from those found in the mouse sarcoma and in virus-induced leukemias. (Dr. J. Donald Hare)

69-579 IMMUNOFLUORESCENCE AND VIRUS RECOVERY: CORRELATION IN A MURINE LEUKEMIA SYSTEM. (E.) Orr, H. C. (Bionetics Res. Labs., Kensington, Md.), J. B. Moloney, J. I. Reisher and H. F. Bushar. Cancer Res. 28(9):1793-1796, 1968.

In weanling BALB/c mice (both sexes) inj. i.p. with 0.25 ml of a 10^{-2} dilution of Moloney leukemia virus with a 50% spleen-enlarging titer (SE_{50}) of 4.66 log U/ml, direct fluorescent antibody studies demonstrated an equivocal fluorescent reaction in the nucleolar area of both plasma and splenic cells 4 days later, spreading progressively thereafter to the entire nuclear area and then throughout the entire cell. Indirect fluorescent antibody studies showed an immunoreaction from 8 days on, spreading progressively from the cell surface through the cytoplasm to the perinuclear area. It is concluded that 2 different antigens appeared to be involved. At the same time, no infectious virus could be recovered before day 16, when 1.09 SE_{50} log U of virus were recovered from the plasma and 0.42 SE_{50} log U of virus from the spleens of inoc. mice. Immunofluorescent studies showed no discernible differences between the viruses recovered from these 2 sites. Immunofluorescence detected less than 0.5 log 50% infectious dose of virus. The immunoreaction increased so rapidly to a plateau that it was not possible to establish any linear relationship between immunofluorescence, the initiating dose and/or the conc. of recovered virus.

69-580 PATHOGENESIS OF AVIAN LYMPHOID LEUKOSIS. I. HISTOGENESIS. (E.) Cooper, M. D. (U. Minnesota, Minneapolis), L. N. Payne, P. B. Dent, B. R. Burmester and R. A. Good. J. Nat. Cancer Inst. 41(2):373-389, 1968.

The earliest neoplastic changes seen in inbred white Leghorn chickens infected at hatching with RPL-12 virus were found in the bursa of Fabricius at 8 wk. of age. Removal of the bursa at 12 wk. prevented dissemination of lymphoid leukosis. Experimental results suggest that physiological influences inducing bursal regression may also cause regression of the tumor. (Dr. E. Y. Lasfargues)

69-581 PATHOGENESIS OF AVIAN LYMPHOID LEUKOSIS. II. IMMUNOLOGIC REACTIVITY DURING LYMPHOMAGENESIS. (E.) Dent, P. B. (U. Minnesota, Minneapolis), M. D. Cooper, L. N. Payne, J. J. Solomon, B. R. Burmester and R. A. Good. J. Nat. Cancer Inst. 41(2):391-401, 1968.

The immunologic competence of chickens infected at hatching with oncogenic virus RPL-12 was studied. No significant impairment in immunologic reactivity was observed by any parameter measured. RSV-neutralizing antibodies were found in 50% of infected birds. (Dr. E. Y. Lasfargues)

69-582 AVIAN LEUKEMIA AND SARCOMA STUDIES. (E.) Stubbs, E. L. (U. Pennsylvania, Philadelphia) and A. M. Wallbank. Bibl. Haemat. 30:109-110, 1968.

A mixed virus strain (strain 13), which induces sarcoma and leukemia in poultry, was reactivated after 20 yr. from stored, desiccated tumor tissue by inj. into 1-day-old chicks. It was possible to transfer strain 13 chicken sarcoma by s.c., i.m., i.p., i.v. and intracranial inj. (no other details). Sarcomas appeared at the site of inj. and in liver, spleen and bone marrow after i.v. inj. No tumors were induced by placing Strain 13 in the bursa of Fabricius and in the vent. Female chicks seemed to be more susceptible than males and max. virus susceptibility was seen at age 3 wk. Exposure of 17-day-old chicks to the virus by the tracheal, esophageal and aerogenic routes caused infection only by the tracheal route. After using web inj., Strain 13 virus induced tumors in the wing web, skeletal muscle, liver and spleen in young guinea fowl. The virus was sensitive to ether and chloroform, resistant to treatment with trypsin, lipase and hyaluronidase, stable at pH 6.7-8 and labile at pH 3. It was considered a RNA virus belonging to the group of myxoviruses.

69-583 STUDY OF THE RELATIONSHIPS BETWEEN THE QUAIL TUMOR VIRUS AND ROUS SARCOMA VIRUS. (Fr.) De Ratuld, Y. (Res. Lab. Phone-Poulenc Chem. Plants Soc., Vitry -sur Seine, France), G. H. Werner. Ann. Inst. Pasteur (Paris) 115(1):122-128, 1968.

The VTC virus from quail embryo tissue cultures produced small regressing sarcomas in quail and chicks. A variant (VTC-P_1) from a first chick passage, produced large, rapidly growing sarcomas. A second, similar variant (VTC-P_6) appeared during sixth passage in 6 Leghorn chicks. RSV (Bryan strain) rabbit immune serum neutralized the original and variant quail viruses, but did not prevent spontaneous cytotoxicity of VTC in quail cell cultures. VTC may be associated with 1 or more helper viruses. VTC-P_6 induced transformation of diploid human embryo fibroblasts (CSSA strain). (Dr. H. E. Pearson)

69-584 CULTURE CHARACTERISTICS OF BRAIN NEUROGLIAL CELLS FROM CHICKENS INFECTED WITH ROUS SARCOMA VIRUS. (E.) Adams, E. V. (Rutgers U., New Brunswick, N. J.). Poult. Sci. 47(3):951-956, 1968.

Neuroglial cell cultures prepared from the brains of chickens inoc. intracerebrally with Rous sarcoma virus (RSV) produced RSV during serial passages and for extended periods of time. During early serial passages, dense, multilayered colonies of small hyperchromatic round cells were present, but virus production continued after the round cells disappeared. Astrocytes and various transitional forms of astrocytes predominated in these cultures. Cells producing RSV appeared morphologically identical to the astrocytes present in the control cultures. Glial cells may play a major role in the synthesis of RSV in the chicken brain. (Dr. E. L. Stubbs)

69-585 CARCINOGENESIS BY AVIAN SARCOMA VIRUSES. (E.) Temin, H. M. (U. Wisconsin, Madison). Cancer Res. 28(9):1835-1838, 1968.

In chick embryo fibroblasts infected with XX Rous sarcoma (RSV) or Fujinami sarcoma virus, experiments with inhibitors of DNA synthesis in stationary or partially synchronized cells demonstrated that DNA synthesis is required for provirus formation and cell division for provirus activation. The conditions under which the cells will then be converted or not are unknown. The multiplication rates of RSV-infected cells depend on the presence and conc. of serum and insulin-like activity in the medium. Converted cells require less of both factors for multiplication; the reasons are unknown.

69-586 DIFFERENCES BETWEEN BRYAN AND SCHMIDT-RUPPIN STRAINS OF ROUS SARCOMA VIRUS. (E.) Okuyan, M. (U. Ankara, Turkey). Acta Med. Turc. 5(1):3-10, 1968.

Both the Bryan (which contains Rous associated virus) and Schmidt-Ruppin (S-R; not containing helper virus) strains of Rous sarcoma virus induced metastatic tumors in 151 12-day-old white Leghorn chickens after wing web inoc. Tumors at the inj. site contained only sarcoma cells. The Bryan strain induced liver metastases with sarcoma cells in the center and lymphoma cells in the periphery, while the S-R strain induced tumors with only sarcoma cells. Pocks induced on the chorioallantoic membrane by the Bryan strain were round; those induced by S-R were oval or spindle-shaped. In chick embryo fibroblast cultures, the Bryan strain produced giant polynucleated and polymorphic cells with foci penetrating into the normal cells of the sheet, while S-R produced foci of uniformly small round cells, separated from normal cells. The Bryan strain was more sensitive to neutralization by sera against avian leukosis viruses than the S-R strain. A high titer of Bryan strain and low titer of S-R strain were neutralized by hyperimmune sera against avian myeloblastosis virus. Hyperimmune sera against Rous sarcoma virus neutralized Bryan strain to a greater degree than S-R strain.

69-587 IMMUNOFLUORESCENT STUDY ON EARLY VIRUS-CELL INTERACTION IN SHOPE PAPILLOMA IN VITRO SYSTEM. (E.) Yoshida, T. O. (Aichi Cancer Ctr., Nagoya, Japan) and Y. Ito. Proc. Soc. Exp. Biol. Med. 128(2):587-591, 1968.

Domestic rabbit embryonic skin cultures were infected with Shope papilloma virus (SPV) in vitro and the early phase of virus-cell interaction was studied sequentially for up to 30 hr. by immunofluorescence. The specific immunofluorescence in the SPV-infected embryonic cells was clearly associated with the nucleus and the positive staining reaction was only induced by the antipapilloma antiserum. Experiments with the anti-SPV antiserum yielded only negative results. It is concluded that the antigen demonstrated in the nucleus of the SPV-infected rabbit cells by immunofluorescence possibly meets at least a part of the criteria of T antigen. (Dr. Merle Mizelle)

69-588 PARTIAL SEPARATION OF THE DNA NUCLEOTIDYLTRANSFERASES OF THE SHOPE RABBIT FIBROMA. (E.) Chang, L. M. S. (Indiana U., Indianapolis) and M. E. Hodes. Biochem. Biophys. Res. Commun. 31(4):545-552, 1968.

The separation of 2 nucleotidyltransferase activities differing in sensitivity to anti-Shope fibroma virus γ-globulin and in DNA priming requirement, using phosphocellulose and DEAE-cellulose, is described. (Dr. J. P. Ransom)

69-589 STUDIES ON L CELLS PERSISTENTLY INFECTED WITH POLYOMA VIRUS: RELATIONSHIP BETWEEN D PARTICLE AND OTHER VIRUS-LIKE PARTICLES. (E.) Kodama, M. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan), K. Kojima and T. Kodama. J. Nat. Cancer Inst. 41(2):565-579, 1968.

A latent infection of the NCTC929 cell line and its subline L4CZ with polyoma virus was manifested by the use of horse serum and a higher pH of the culture medium. Virus production fluctuated from time to time; some lines lost their virus productivity completely. The polyoma virus isolated from L cells had low infectivity. Numerous D particles in the nucleus and a marked increase of A particles inside and outside the cytoplasm were observed in L-929 cells. Similar findings were made in another L cell line artifically infected with a standard polyoma virus, which line contained many C particles in addition to the described A and D particles. (Dr. E. Y. Lasfargues)

69-590 VIRUS PARTICLES IN RENAL TUMORS OBTAINED FROM SPRING Rana pipiens OF KNOWN GEOGRAPHIC ORIGIN. (E.) McKinnell, R. G. (Tulane U., New Orleans, Louisiana) and J. Zambernard. Cancer Res. 28(4):684-688, 1968.

Virus particles were characteristically associated with the cells of spontaneous renal adenocarcinomas obtained from *Rana pipiens*, collected from several places in Minnesota during the spring of 1967, while the affected frogs were still in overwintering lakes or breeding ponds. Electron microscopic examination of 11 renal tumors showed intranuclear, cytoplasmic and extracellular virus particles. The histology of 1 renal tumor (studied by light microscopy) resembled that of tumors of frogs maintained in a cold laboratory environment. These results are in contrast with the variable cytology and fine structure reported in renal tumors obtained in frogs from commercial sources. (Dr. J. Donald Hare)

69-591 ELECTRON MICROSCOPE STUDY OF HUMAN LEUKEMIC CELLS IN TISSUE CULTURE. (E.) de Harven, E. (Sloan-Kettering Inst. Cancer Res., N.Y.). *Bibl. Haemat.* 30:300-302, 1968.

69-592 THE ISOLATION OF A MYXO TYPE VIRUS FROM TWO HUMAN SARCOMAS. (E.) Stewart, S. E. (NCI, Bethesda, Md.). *Bibl. Haemat.* 30:333-334, 1968.

69-593 VIRUS PARTICLES IN A CULTURED HODGKINS LYMPH NODE. (E.) Stewart, S. E. (NCI, Bethesda, Md.). *Bibl. Haemat.* 30:335-337, 1968.

69-594 ANTIBODIES IN PRIMATES TO HUMAN AND SIMIAN VIRUSES: A COMPARATIVE STUDY. (E.) Kalter, S. S. (Southwest Found. Res. Ed., San Antonio, Tex.). *Bibl. Haemat.* 30:338-342, 1968.

69-595 DETERMINANTS OF VIRAL CARCINOGENESIS. (E.) Melnick, J. L. (Baylor U. Coll. Med., Houston, Tex.). *Bibl. Haemat.* 30:1-10, 1968.

69-596 THE EFFECT OF INTERFERON PREPARATIONS ON FRIEND LEUKEMIA OF MICE. (E.) Gresser, I. (Sci. Res. Inst. Cancer, Villejuif, France). *Bibl. Haemat.* 30:37-39, 1968.

69-597 ROLE OF IMMUNOLOGICAL TOLERANCE IN VIRAL LEUKEMOGENESIS OF THE MOUSE. (E.) Chieco-Bianchi, L. (U. Padua, Italy), G. Tridente, N. Pennelli, and L. Fiore-Donati. *Bibl. Haemat.* 30:40-42, 1968.

69-598 BIOLOGICAL AND PHYSICAL PROPERTIES OF A LEUKEMOGENIC AGENT OF A NEW TYPE OF VIRAL MURINE LEUKEMIA. (E.) Libánský, J. (Inst. Hematol. and Blood Transf., Prague), O. Mach, and O. Novotná. *Bibl. Haemat.* 30:78-80, 1968.

69-599 QUANTITATIVE ASSAY OF MOLONEY LEUKEMIA VIRUS AND RAUSCHER LEUKEMIA VIRUS BY IMMUNOFLUORESCENCE IN CELL CULTURE. (E.) Pinkel, D. (U. Tennessee, Memphis) and K. Yoshida. *Bibl. Haemat.* 30:89-91, 1968.

69-600 STUDIES ON THE PRODUCTION OF RAUSCHER LEUKEMIA IMMUNITY IN BALB/c MICE. (E.) Gelzer, J. (CIBA, Ltd., Basel, Switzerland). *Bibl. Haemat.* 30:97-98, 1968.

69-601 VARIATIONS IN LIVER CATALASE ACTIVITY IN MICE CAUSED BY TUMOROUS AND NON-TUMOROUS FACTORS - ITS RELATIONSHIP TO THE ACTIVITY OF THE RETICULO-ENDOTHELIAL SYSTEM. (E.) Lamensans, A. (Pasteur Inst., Paris), G. Biozzi, C. Stiffel, and M. F. Mollier. *Bibl. Haemat.* 30:99-100, 1968.

69-602 STUDIES ON VIRUS ATTENUATION IN MOUSE LEUKEMIA. (E.) Sinkovics, J. G. (U. Texas M.D. Anderson Hosp. Tumor Inst., Houston), C. D. Howe, and C. C. Shullenberger. *Bibl. Haemat.* 30:73-75, 1968.

69-603 ON THE STRUCTURE OF THE LEUKEMIA VIRUSES. (E.) De-Thé, G. (Res. Ctr. Normal Cancer Cells, Villejuif, France). *Bibl. Haemat.* 30:54-56, 1968.

69-604 RECENT STUDIES ON THE ETIOLOGY OF MOUSE LEUKEMIA AND LYMPHOMAS. (E.) Gross, L. (VA Hosp., Bronx, N. Y.). *Bibl. Haemat.* 30:48-53, 1968.

69-605 MULTIPLICITY OF CELL RESPONSE TO A MURINE ERYTHROBLASTOSIS VIRUS. (E.) Kirsten, W. H. (U. Chicago, Ill.), K. D. Somers and L. A. Mayer. *Bibl. Haemat.* 30:64-65, 1968.

69-606 PATHOLOGY OF VIRUS LEUKEMIA IN THE MOUSE. (E.) Siegler, R. (Albert Einstein Med. Ctr., Philadelphia, Pa.) and M. A. Rich. *Bibl. Haemat.* 30:66-69, 1968.

69-607 VARIABILITY OF LEUKEMOGENIC POTENTIAL OF RAUSCHER VIRUS IN CULTURE. (E.) Barski, G. (Gustave Roussy Inst., Villejuif, France), J. K. Jung, and D. Barbieri. *Bibl. Haemat.* 30:76-77, 1968.

69-608 BOVINE LEUKOSIS IN GREAT BRITAIN. (E.) Anderson, L. J. (U. Glasgow, Scotland) and W. F. H. Jarrett. *Bibl. Haemat.* 30:193, 1968.

See also abstract nos.: 445,447,450,456,464,465,493,524,644,651

69-609 EPIDEMIOLOGY OF ESOPHAGEAL CANCER IN THE AKTIUBINSK REGION OF KAZAKH SSR. (Rus.) Bashirov, M. Sh. (Kazakh Sci. Res. Inst. Cancer Rad., U.S.S.R.), S. N. Nugmanov and N. I. Kolycheva. Vop. Onkol. 14(8):3-6, 1968.

Esophageal cancer morbidity in the Aktiubinsk region in 1965 was 46.49/100,000 population, or 30.1% of all other cancer forms; from 1959-1965, 1426 cases were registered, of whom 1314 (92.14%) were Kazakhs. In 1959, the morbidity rate/100,000 was 75.6 and only 6.6 in Russians in the same territory. These 1426 pts. included 719 males and 707 females; the 1965 morbidity rates were 43.5 and 49.7/100,000, resp. Among 301 cancer pts. (142 males, 159 females) used for epidemiological studies, 94.35% of the pts. and 96.34% of controls were born and lived in the Aktiubinsk region; 10.3% and 5.3%, resp., had family histories of esophageal cancer. Consumption of hot tea was high in 129/142 males and 158/159 females with cancer (over 6 cups at a time; over 10 cups at a time in 40.22% males and 45.25% females), compared to 113/142 male and 156/159 female controls (41.55% and 69.18%, resp., with very high tea consumption). Therefore, hot tea could not be considered a basic factor causing the increase in the esophageal cancer frequency among Kazakhs. However, 43.66% of the male cancer pts. and 21.12% of the male controls drank tea in a reclining position (all females drank tea while seated). A possible connection is discussed. Among male pts. 38.73% were smokers (72.72% of them for 21 yr., or more compared to 19.7% and 78.6%, resp., in controls. Among females, 3.7% of the pts. were smokers, compared to 0.6% of controls. Therefore, smoking had no essential role in the development of esophageal cancer. The use of "nas" (a preparation containing Nicotiana rustica) was reported in 23.24% and 1.88% of the male and female cancer pts., resp., compared to 30.98% and 1.26%, resp., in controls. Alcohol consumption was found among 57.74% of the male cancer pts. (9 showed alcohol abuse) and 44.3% of the controls. Females of both groups denied alcohol consumption. Therefore, alcohol plays no role in the development of esophageal cancer. Histories of esophagitis and injuries were noted in 7/301 and 10/301 with cancer, resp.

69-610 GASTRIC CANCER. (Sp.) Borges C., C. (Nat. Inst. Nutrition, Mexico City) and J. J. Villalobos Perez. Rev. Invest. Clin. 20(1):11-23, 1968.

Pt. records filed with the Mexican National Institute for Nutrition over a 20-yr. period showed stomach cancer in 393/55,000 cases (349/393 confirmed histologically, the remainder by X-ray). The group of pts. with cancer of the stomach accounted for (35.5%) of the total; other g.i. tumors involved the colon (21.7%), gallbladder and related structures (14.5%), pancreas (10.4%), esophagus (6.2%), liver (6.2%), duodenum and periampullar region (3.3%) and miscellaneous sites (2.2%). Of the pts. with stomach cancer, 62% were male and 38% female (compared to 57% and 43%, resp., of the total pt. population); the median age, at diagnosis was 56 yr. and 30% were under 50. Possible etiologic factors were studied by comparing the stomach cancer pts. with 500 healthy subjects. There was no apparent relationship between stomach cancer and the use of tobacco (46.5% of the pts. and 46% of controls used no tobacco and about 20% of each group reported heavy use); 18% of the cancer pts. and 3% of the controls were heavy drinkers, while 56% and about 67%, resp., did not drink. Deficient diets were reported by 30% of the cancer group and 8% of the controls. There was no demonstrable relationship between g.i. cancer and the ingestion of irritating foods or condiments such as chili. Approx. 9% of the stomach cancer pts. had familial histories of cancer (g.i. cancer in approx. 50%), compared to 6.5% and approx. 33%, resp., in controls. Personal histories of cancer were reported in 4 pts. (1 man with skin cancer, 3 women with breast cancer) and none of the controls. Gastric acidity (studied in 250 cancer pts.) was normal in 25%, high in 4% and low in 15%; anacidity was seen in 56%. X-ray studies showed evidence of prior peptic ulcer in 10.2% of the cancer pts. (gastric ulcer in 8.2%), suggesting no significant correlation between the 2 disorders. Another study (previously reported) showed a higher incidence of blood type A in pts. with stomach carcinoma than in pts. with gastric ulcer.

69-611 MALIGNANT LESIONS OF THE SMALL INTESTINE. (E.) Brookes, V. S. (United Birmingham Hosps., England), J. A. H. Waterhouse and D. J. Powell. Brit. J. Surg. 55(6):405-410, 1968.

The Birmingham (England) Regional Cancer Registry showed 168 cases of malignant disease of the small intestine from 1950 through 1959; 55 were carcinomas, 56 were sarcomas, 32 were carcinoid tumors and 25 were of indeterminate histology. The 55 cases of carcinoma of the small intestine compared with 5441 cases of carcinoma of the stomach and 8968 cases of carcinoma of the large intestine recorded during the same period. The difference in incidence between small intestine and stomach or colon cancer could not be explained, but the retention of potentially proliferating cells in the stomach and colon is greater than the retention seen in the small intestine in animals and perhaps also in man. These data for the types of malignancy of the small intestine are similar to those gathered at the Mayo Clinic during a 25-yr. period (327 cases). In the Birmingham study the carcinoma resectability rate was 50%, with a 5-yr. survival rate of 32.1% for the resected cases (almost double the rate for stomach carcinoma). The prognosis of sarcoma was slightly more favorable than that of carcinoma; in radically treated cases, the 5-yr. survival rate was 41%. Adenocarcinomas were found in all areas of the small intestine, whereas sarcomas were found in the lower portions. Carcinoid tumors occurred almost exclusively in the ileum, particularly its terminal portion.

69-612 THE INCIDENCE OF BENIGN AND MALIGNANT NEOPLASMS OF THE COLON AND RECTUM: A POSTMORTEM STUDY. (E.) Hughes, L. E. (U. Queensland, Brisbane, Australia). Aust. New Zeal. J. Surg. 38(1):30-35, 1968.

In a prospective study of 200 unselected colon and rectum specimens (2 groups of 100 each) removed at autopsy in Queensland (Princess Alexandra Hospital) in 1964 the over-all incidence of polyps larger than 3 mm in diameter was 20%. None was of the metaplastic type. Solitary, double and multiple polyps were present in 16/40, 9/40 and 15/40, resp.; 2 were villous papillomas and 38/40 were benign adenomatous polyps. The number of pts. with colonic polyps, tabulated by age, was 2/27 (7%) under 50 yr., 5/28 (18%) at age 51-60, 10/45 (22%) at age 61-70, 11/63 (17%) at age 71-80, 7/29 (24%) at age 81-90 and 5/8 (62%) at age 91 and over. Colon carcinoma was present in 8 pts. and 2 other pts. had previously undergone successful resection of carcinoma. Polyps and carcinoma were seen in 34/110 (31%) and 5/110 (4.5%) males and in 6/90 (7%) and 5/90 (5.5%) females, resp.; 4/10 with carcinoma also showed polyps (multiple in 3/4). The polyps were slightly more common in the right (18) than left (14) colon; 1 pt. showed polyps of the transverse colon and 7 pts. had polyps spread throughout the colon. It is concluded that the majority of adenomatous polyps are self-limiting in growth; it is suggested that the same factors might predispose to polyps and cancer.

69-613 CARCINOMA OF THE TRANSVERSE COLON AND THE SPLENIC FLEXURE. (E.) Bacon, H. E. (Temple U. Hosp., Philadelphia, Pa.) and A. R. Gennaro. Surg. Gynec. Obstet. 127(3):523-527, 1968.

Carcinoma was found in the transverse colon or splenic flexure in 58/2626 pts. with carcinoma of the colon, rectum or anal canal. Among 40/58 who were studied closely, the tumor was located in the transverse colon in 17/40 and at the splenic flexure in 23/40. In 14/40, physical examination showed no abnormality related to the presence of the tumor and in 2/40 (with tumors situated in the splenic flexure) an initial X-ray examination was also negative. The male:female ratio was 21:19. Age distribution was typical of that seen for other colorectal carcinomas, with a rising incidence above age 50 and a peak observed at age 60-70. The 1 female who appeared in the 21-30 yr. age group was 21 yr. old, and both her father and brother had been treated previously for colon carcinoma. No additional details are given concerning age of incidence or familial histories. The duration of symptoms was 2 days-2 yr. (2-7 mo. in most pts.). In 3/40 with liver metastases, alkaline phosphatase levels were normal. Additional lesions found in 13/37 pts. treated by resection included benign polyps (6/37), polyps with in situ malignant changes (4/37), ulcerative colitis (1/37), synchronous carcinomas in the rectum or rectosigmoid (4/37) and metachronous carcinomas in the cecum and left colon (1/37; 1 and 3 yr., resp., after resection of the transverse colon). In 14/40, the primary was confined to the intestinal wall (although 10/14 showed lymph node and 1/14 showed hepatic metastases). Duckes' B, C_1 and C_2 lesions were shown by 10/40, 10/40 and 6/40, resp.

69-614 OUR EXPERIENCE WITH COLORECTAL CARCINOMA. (Sp.) Picone, D. Orientacion Med. 17(806):373-375, 1968.

Deaths due to colorectal cancer in the Province of Santa Fe, Argentina, are reported to total 300-350/yr., or approx. 10% of all deaths due to cancer. Approx. 60-70% of these pts. are adults between 50-70 yr. of age and 90% are over 40. In 34 consecutive cases selected at random, the age distribution was: 30-40 yr. = 2/34, 41-50 yr. = 2/34, 51-60 yr. = 11/34, 61-70 yr. = 11/34, 71-80 yr. = 5/34, 81 yr. and over = 3/34. The group included 19 men and 15 women; no significant sex difference was noted with reference to the age of initial appearance of symptoms. Tumors were localized in the right colon in 32% and in the left colon in 68% (the point of division being taken as the sphincter of Canon). Affected in decreasing order of frequency (no other details) were the sigmoid, ascending and transverse colon, with 1 case each involving the hepatic and splenic flexures. The descending colon was not involved in any instance.

69-615 QUANTITATIVE DIFFERENCES OF MASS IN NORMAL AND MALIGNANT CELLS IN THEIR BIOLOGICAL PHASES. (E.) Chatterjee, R. (Chittaranjan Nat. Cancer Res. Ctr., Calcutta, India), B. Bhattarcharya and P. De. Indian J. Cancer 5(2): 198-200, 1968.

Mass conc. measurements of cytoplasm, nuclei and nucleoli from human cervix specimens (3 normal, 5 epidermoid carcinoma) cervices during their growth (75 normal, 134 malignant cells assessed) and differentiation phases (81 normal, 134 malignant cells assessed) showed an increase of cytoplasmic mass during the differentiation phase when compared to the growth phase in normal cells (from 1.65 ± 0.660 to 3.256 ± 0.928 $\mu\mu g/\mu^2$; stimulation at 0.1% statistical level). No such stimulation was noted in the cytoplasm of malignant cells. There were no significant differences in nuclear mass conc. between the growth and differentiation phases in either normal or malignant cells. No increase of nucleolar mass conc. in malignant cells during these 2 phases was observed; no such measurements of normal differentiating cells could be made because no nucleoli were seen.

69-616 CLINICAL-STATISTICAL STUDY OF THE SIMULTANEOUS OCCURRENCE OF DIABETES MELLITUS AND MALIGNANT TUMORS. (It.) Magris, D. (Maggiore Hosp., Trieste, Italy) and M. Udovich. Minerva Med. Giuliana 8(2):106-109, 1968.

A review of records of a large urban hospital between 1957-1966 (inclusive), showed diabetes mellitus in 4.5% of 47,983 pts. and malignant tumors in 3.8% (1847 pts.); the cancer incidence in pts. with diabetes was of 0.24% (117/2140). There were no significant sex differences; cancer was reported in 37/720 diabetic men and 80/120 women (5.1% and 5.6%, resp.). There were no significant age differences, except for the absence of cancer in the 32 diabetic pts. under 30 and a numerical but statistically insignificant increase in the cancer incidence at age 30-39, compared to the next 4 decades (13.2%, compared to 8.6%, 5.4%, 4.9% and 5.3%, resp.). Cancer was relatively more frequent in pts. with occult diabetes or diabetes of 1-5 yr. duration (6.7% and 6.2%, resp.) than in pts. with diabetes of 6 yr. or more duration. Cancer was also more frequent in pts. with mild or very mild diabetes (6.8% of each group) than in pts. with moderate or severe diabetes (1.7% and 2.9%, resp.); the cancer incidence in pts. receiving no diabetic therapy, p.o. hypoglycemic agents and insulin was 7.2%, 5.7% and 3.8%, resp. (not a significant difference). In 1847 pts. with malignant diseases (excluding cancer of the pancreas, pituitary, adrenal or thyroid), the diabetes incidence was 6.3% (117 pts.). Diabetes was not noted in the pts. with cancer of the larynx (32), brain (3) or bones (1); the incidence was significantly reduced in leukemia (3/124 = 2.4%) and significantly increased in cancer of the skin (7/35 = 20%) and uterus + ovary (29/232 = 12.5%). The diabetes incidence was 2/8 in tongue cancer and 7.9-9.3% in pts. with sarcoma (3/32) or cancer of the liver (10/120), bladder + kidney (4/50) and colon + rectum (15/176), compared to 2.4-5.9% in cancer of the breast (14/236), lung (18/421), stomach (9/262), esophagus (1/33) or prostate (2/82).

69-617 GLUCOSE TOLERANCE AND ENDOMETRIAL CARCINOMA. (E.) Dunn, L. J. (U. of Iowa Hosps., Iowa City), J. A. Merchant, J. T. Bradbury and D. B. Stone. Arch. Intern. Med. 121(3):246-254, 1968.

The relationships between endometrial carcinoma and the triad of diabetes mellitus, obesity and hypertension were studied in 55 pts. with endometrial carcinoma and 114 age-matched controls. Obesity was seen in 72.2% of the cancer pts. and in 58.6% of the controls. In the married women, parity was lower in the cancer pts. (28.2% were nulliparous and the others had an av. of 2.7 pregnancies, compared to 7.3% and 4.9, resp., in controls). Sustained arterial hypertension was seen in 51.9% with cancer and 55.6% of the controls (not a significant difference); anterior pituitary function (gonadotropin production) was about the same in both groups. Glucose tolerance tests were normal in 19.9% with cancer and 18.4% of the controls, probable diabetic in 32.8% and 36.9%, resp., and diabetic in 47.3% and 44.7%, resp. (including known diabetics); family history interviews showed the same frequency of familial diabetes in both groups (not specified). There was no apparent correlation between reduced glucose tolerance and increased parity and no close association between obesity and reduced glucose tolerance. The only significant differences between the pts. with cancer and the controls were in body wt. and parity.

69-618 INTRASCROTAL SARCOMAS. (E.) Alexander, F. (Queen's U., Belfast, Northern Ireland). Brit. J. Cancer 22(3):486-497, 1968.

Examination of the files of the Royal Victoria and Belfast City Hospital over 35 yr. revealed 12 cases of paratesticular sarcoma among a population of 1.5 million (Northern Ireland); 9 pts. are described fully (4 rhabdomyosarcoma, 3 leiomyosarcoma, 1 fibrolyposarcoma, 1 undifferentiated sarcoma) and 3 briefly. One pt. with rhabdomyosarcoma was a 4-yr.-old boy and 2/4 were 17-18 yr. old; the other 9 pts. were 50-72 yr. old. Previous testicular trauma was reported by 5 pts. (1-27 yr. before diagnosis).

69-619 BREAST CANCER IN THE AREQUIPA GENERAL HOSPITAL. (Sp.) Valdivia Ampuero, A. (Gen. Hosp., Arequipa, Peru) and E. Macedo Macedo. Acad. Peru Cirug. 20(3):173-181, 1967.

Among all cancer pts. treated in the General Hospital of Arequipa, Peru in 1960-1966 (inclusive), 47/1065 (4.44%) had breast cancer (30/47 undifferentiated canalicular carcinoma, 4/47 comedone carcinoma, 3/47 medullary carcinoma, 1/47 Paget's disease, 2/47 acinar or lobular carcinoma, 5/47 unidentified, 1/47 each, carcinosarcoma and extraskeletal osteogenic sarcoma). The incidence of other cancers, tabulated by site, was cervix = 23.94%, skin = 11.45%, stomach = 7.33%, endometrium = 3.78%, prostate = 2.72%, thyroid = 2.54%, gallbladder = 2.53%, lymphoma = 3.94%, other (unspecified) = 37.46%. The age distribution in the pts. with breast cancer was: 0-32 = 0, 33-40 = 9/47, 41-50 = 19/47, 51-60 = 9/47, 61-70 = 3/47, 71-80 = 5/47 and 80-85 = 2/47; 12/47 had no children, 11/47 had 1-3, 16/47 had 4.7 and 8/47 had 8-over 10 children (a significant decrease with parity).

9-620 MORTALITY FROM CANCER OF THE CERVIX UTERI IN BRITISH COLUMBIA AND OTHER PARTS F CANADA. (E.) Ahluwalia, H. S. (Inst. Med. es., Kuala Lumpur, Malaysia) and R. Doll. Brit. . Prev. Soc. Med. 22(3):161-164, 1968.

uring the 11-yr. period of 1955-1965 (inclusive), tandardized annual mortality rates/100,000 women or cancer of the cervix at age 20-44, 45-65 and 5 + were 2.8-6.8, 13.5-22.2 and 12.8-59.7, resp., n British Columbia, compared to 3.7-5.8, 18.2-5.4 and 20.4-37.3, resp., in Ontario and 4.0-5.9, 8.0-22.5 and 22.9-33.3, resp., in the rest of anada. Comparable mortality rates from other terine cancers were 0.4-0.9, 8.7-22.7 and 19.9-7.8, resp., in Ontario: 1.0-2.1, 10.9-19.7 and 7.5-57.2, resp., in the rest of Canada except ritish Columbia; and 0.7-1.9 (for 1955-1959 only), .5-13.4 (for the entire 11-yr. period) and 21.1-7.5 (for the entire 11-yr. period), resp., in ritish Columbia. In the 20-44 yr. age group in ritish Columbia (alone), the mortality rate for terine cancer other than cervical dropped abruptly rom 1.9 in 1959 to 0.3 in 1960-1961 (inclusive) nd then to 0.0 during 1962-1965 (inclusive). his province also showed 2 other marked deviaions during the 11-yr. period reported. The ortality rate for cervical cancer in the 20-44 r. age group dropped from 4.8 in 1955 to 3.0 and .8 in 1956 and 1957, resp., before rising to 6.0 n 1958. In the age group 65 yr. and over, it ropped progressively from 24.8 in 1957 to a low of 12.8 in 1960, followed by an abrupt rise to 30.3 in 1961 and 59.7 in 1962, before stabilizing again within a range of approx. 21-25. No exlanation is offered for these variations; however, available statistics give no evidence thus far that mass cytological screening (practiced routinely in British Columbia since 1949) has significantly affected over-all mortality from cervical or other forms of uterine cancer.

69-621 A STUDY OF CANCER INCIDENCE AND PREVALENCE IN ONTARIO, 1964; A PRELIMINARY REPORT. (E.) MacKay, E. N. (Ontario Dept. Health, Toronto, Canada) and A. H. Sellers. Canad. Med. Ass. J. 99(7):313-315, 1968.

Among 29,814 cases of cancer identified in Ontario during 1964, the most frequent sites of incidence in men (total not specified) were as follows: skin = 18% (of all cases reported), bronchus and lung = 13%, prostate = 13%, large intestine = 7%, bladder = 7%, stomach = 5% and rectum = 5%. The most frequent sites of incidence in women were breast = 25%, skin = 15%, large intestine = 9%, cervix uteri = 8%, other uterine = 5%, ovary = 4% and rectum = 4%. The reported frequency by age was: under 15 yr. = 2% (of all cases reported), 15-44 yr. = 12%, 45-64 yr. = 37%, 65 yr. and over = 49%. Of the entire group, 34% died from or with cancer during 1964; 72% of all reported cases were listed as hospitalized during 1964 (10% listed in 2 or more hospitals). A total of 21% of all reported cases had 2 or more discharges from hospital during 1964 and 219 pts. were discharged 5 or more times (35 with leukemia, 33 with g.i. cancer and 28 with breast cancer). The ratio of total reported cases to officially registered deaths due to cancer was 3.3.

69-622 A COMPARISON OF CANCER MORTALITY RATES BETWEEN BORDER PROVINCES OF CANADA AND THE ADJACENT STATES. (E.) MacDonald, E. J. (U. Texas M.D. Anderson Hosp., Houston) and P. F. Wolf. Med. Rec. (Houston) 61(7):208-209, 233, 1968.

A preliminary summary of findings based on age-adjusted mortality rates for white males and females in the U.S. for 1950-1959, age-adjusted for the 1956 Canadian population, showed differences for several sites between Canadian provinces and adjoining states. The mortality rates from lung, bladder and prostate cancer, Hodgkin's disease and leukemia were lower in the Canadian provinces. Quebec had a higher mortality rate (males and females) than adjoining New Hampshire and Vermont from cancer of the buccal cavity, pharynx, larynx, stomach and intestine (except for rectum, liver and biliary passages). There was a greater similarity in cancer mortality rates between the U.S. states and adjacent Canadian provinces among females than males. The closest similarity for males was between British Columbia and Washington (except for prostate cancer, which was higher in Washington). The highest mortality figures for cancer of all sites were noted among males in New York and females in Quebec. New York had the second highest mortality rates for cancer of all sites among females.

69-623 A CANCER SURVEY IN LOURENÇO MARQUES, PORTUGUESE EAST AFRICA. (E.) Prates, M. D. (Miguel Bombarda Hosp. Lourenço Marques, Portuguese E. Africa) and F. O. Torres. Arq. Pat. 39(1 & 2):65-95, 1968.

In a survey of the 5-yr. incidence (1956-1961) of cancer in random samplings of 3 statistical populations, totaling 4291 pts. and representing approx. 100,000 Africans resident in Lourenço Marques or its immediate environs, 403/600 with cancer were males and only 197/600 were females, with adults over 30 accounting for 53.6% and 70.0% of the totals, resp. Cancer of the liver accounted for 65.5% of all tumors in males, followed by cancer of the bladder (5.9%), lymphoma and reticulum cell sarcoma (4.4%) and skin cancers (3.2%). Comparable tabulations among women and girls were 31.0%, 10.6%, 3.0% and 4.6%, resp., with cervical cancer (21.3%) second highest in frequency of occurrence. The estimated rates/100,000 for liver cancer were 98.2 for men and 27.0 for women, as compared to 14.0 in Johannesburg Bantu men, 1.7 in U.S. whites and 3.2 in U.S. non-whites. Cirrhosis of the liver was present in 87% of the actually reported cases of primary liver cancer. The incidence of liver cancer in men and women with cirrhosis men was 61.5% and 51.4%, resp. A possible, but not certain, factor in the high incidence of both disorders was the prevalence of severe, chronic dietary insufficiency from earliest childhood (especially kwashiorkor). The estimated incidence of cancer of the larynx, lung, breast, buccal cavity and g.i. tract (except liver) was very low as compared to either South African Bantu or U.S. whites or non-whites. The low lung and mouth cancer incidence was attributed to moderate smoking habits: 70% of non-resident and 66.4% of resident males used no tobacco (in females, 65% and 58%, resp.), 21.8% and 19.5% of the males, resp., smoked cigarettes (in females, 1.7% and 0.5% , resp.), 7.8% and 13.3% of the males, resp., used snuff (in females, 33.3% and 41.5%, resp.), 2 men smoked hemp and 4 smoked pipes. The estimated incidence of cancer of the bladder was about the same as in South African Bantu; but approx. 50% of the rate reported for the U.S. (white + non-white). The estimated mean cancer incidence in children under 10 was approx. the same as in U.S. non-whites of the same age group; in older children (10-14 yr.) it was approx. 4 times as great as among U.S. non-whites of the same age group, due entirely to the increased incidence of primary liver carcinoma. The Burkitt lymphoma was seen in 93 pts., accounting for 12% of all tumors in males and 6.2% in females (age-adjusted incidence 3.0/100,000).

69-624 MEDICOSTATISTICAL INFORMATION FROM DENMARK FOR THE YEARS 1965 AND 1966. (E.) Dreyer, K. (Nat. Health Serv., Copenhagen) and H. Hamtoft. Danish Med. Bull. 15(6):182-192, 1968.

Malignant neoplasms, including neoplasms of the lymphatic and hematopoietic systems, accounted for 5313/26,644 male and 5072/22,700 female deaths due to all causes in Denmark in 1966 (total 10,385/49,344, compared to 10,651/47,884 in 1965). Comparable tabulations/100,000 population were 223.4/1120.4, 209.6/938.2, 216.5/1028.5 and 224.0/1006.8, resp. In 1966, lung cancer mortality was 1220 among men, and 250 among women, compared to 1227 and 257, resp., in 1965. The corresponding rates/100,000 population in 1966 were 51.3 for men and 10.3 for women (total 30.7 for both sexes, compared to 31.2 in 1965). The absolute number of discharged pts. (including deaths) treated in Danish hospitals during the fiscal yr. 1965-66 and 1964-65, tabulated by tumor site, was: stomach = 2220 and 2216, resp.; intestine (excluding rectum) = 2155 and 2219, resp.; rectum = 1887 and 1912, resp.; trachea, bronchus and lung = 3340 and 2853, resp.; breast = 3611 and 3393, resp.; cervix and corpus uteri = 4229 and 4177, resp.; prostate = 1370 and 1424, resp.; other and unspecified sites = 11,868 and 11,183, resp.; lymphatic and hematopoietic neoplasms (L.C.D. Numbers 200-205) = 3020 and 2830, resp.

69-625 THE INCIDENCE AND COMPARISON OF SKIN DISEASES IN HONG KONG AND NEW ZEALAND. (E.) Hill, B. H. R. (U. of Hong Kong). Aust. J. Derm. 9(3):248-255, 1968.

Skin diseases seen in 21,545 Hong Kong pts. (nearly all were Chinese) in 1964 and in 1811 New Zealand pts. (under 5% were Maoris) in 1961 were compared. The mean age of the entire Hong Kong population (about 4 million) is 15 yr., compared to an av. of 40 yr. in the studied area of New Zealand (a coastal area of the North Island, including prosperous farm areas and 3 large cities). Skin carcinomas were seen in 0.04% of the Hong Kong pts. (8 basal cell, 4 squamous cell) and 5.3% of the New Zealand pts. (73 basal cell, 25 squamous cell); melanoma was seen in 0% and 0.3% (6 pts.), resp., and other malignant skin tumors in 0.04% and 0.4% (10 and 8 pts.), resp. Benign skin tumors were seen in 0.1% and 1.8% (22 and 34 pts.), resp.; verruca was seen in 3.3% and 10% (760 and 184 pts.), resp. Pigmented and hairy nevi were seen in 0.1% and 1.4% (21 and 25 pts.), resp., angiomatous nevi in 0.1% and 1.9% (21 and 35 pts.), resp., seborrheic nevi in 0.05% and 0.83% (12 and 15 pts.), resp., and nevi of other types in 0.19% and 3.20% (38 and 58 pts.), resp. Solar keratosis was seen in 0.04% and 10.5% (10 and 191 pts.), resp., light sensitivity in 0.1% and 0.7% (25 and 12 pts.), resp., von Recklinghausen's neurofibromatosis in 0.03% (8 pts.) and 0%, resp., dermatitis medicamentosa in 15.2% (3383 pts.; this was attributed to widespread use of folk medicines in Hong Kong) and 3.5% (63 pts.), resp., and industrial dermatitis in 0.1% and 2.9% (32 and 53 pts.), resp. The high incidence of malignant skin tumors and premalignant diseases in New Zealand was attributed to sun exposure and low skin pigmentation. Skin pigmentation was believed to protect Hong Kong residents from industrial dermatitis.

69-626 CANCER REGISTRY OF PERNAMBUCO: UNIVERSITY DEPARTMENT OF PATHOLOGICAL ANATOMY. (Por.) de Barros Coelho, R., B. K. Grande de Arruda, M. R. Costa Carvalho, A. R. L. de Carvalho, and C. B. Fernandes Lima. Rev. Bras. Cancer. 23(34):23-29, 1967.

An initial project of the Cancer Registry Service of the Dept. of Pathological Anatomy of the Medical College of Pernambuco University (which began its activities on May 1, 1967) is a review of statistical data for Recife Province (Brazil) for 1950-1966, made available by the Division of Biostatistics. During this interval, the cancer mortality rate showed a progressive, consistent rise from 2.59% to 5.16% of all deaths. Comparing mean values for the first 3 yr. and the last 3 yr. of this period, this represents an increase of 39.56%; by comparison, mortality rates from heart disease, g.i. disorders and accidents rose 50.65%, 42.95% and 43.73%, resp. During this 16-yr. interval, cancer deaths/100,000 population increased from 51.66 to 61.95 in men, with a peak of 62.57 in 1963, and a low of 45.58 in 1958. Comparable tabulations for women showed a decrease from 71.62 to 68.56, with a peak of l.31 in 1952 and a low of 64.87 in 1957. When ancer deaths/100,000 population were tabulated y age for men and women separately, the incidence n women was higher than that for men at all ages rom 14-60 yr. (data for children under 15 were ot significant because of the small number of ases). Between ages 20-49 yr., the male:female atio was always in excess of 3:5. After age 60, he incidence was slightly but not significantly igher for men. In 1964-1966 (inclusive), more han 70% of reported tumors involved the g.i. ract, peritoneum, breast and/or genitourinary ract. In 1948-1966 (inclusive), approx. 50% of ll reported tumors involved the lymphatic tissue nd/or the hematopoietic systems. During the 20 r. prior to report the incidence of g.i. cancer ose markedly, affecting both sexes to an essenially equal degree (no other details).

9-627 STATISTICAL EVALUATION OF THE TREND OF MALIGNANT NEOPLASMS IN ITALY. (It.) or. C. (Civil Hosp., Tirano, Italy) and G. iannattasio. *Gazz. Med. Ital.* 127(4):146-152, 968.

he cancer mortality rate (number/100,000 populaion throughout) in Italy rose from 60 in 1900 o 166 in 1955; this was attributed partly to agng of the population (the over-55 group increased 3%, with a 17% increase in cancer mortality, rom 1951 to 1961) and partly to improved diagostic methods and the side effects of improved anitation, reducing mortality from infectious iseases. Large regional variations were seen in 1963, the total cancer mortality rates in alabria and the Venice district were 81 and 235, esp.), but seem to be decreasing. The greatest ncrease in cancer mortality was in respiratory ancer (13.1 in 1955 to 23.8 in 1964, a 95.1% ncrease). In the same period, increases in the ortality rates from other tumors were: breast 8.2%, urinary tract 44.7%, hematopoietic tissue 3.7%, female genital organs 9.5%, male genital rgans 46.5%, stomach 4.6%, other g.i. organs and eritoneum 15.6%. The total population of Italy ncreased 6% from 1951 to 1961, but the cancer ortality rate increased 28%.

9-628 FREQUENCY OF NEOPLASTIC DISEASES IN CHILDREN AND THE INCIDENCE OF THE VARIOUS ORMS IN THE CASE RECORDS OF THE PEDIATRIC CLINIC F GENOA IN 1950-1967. (It.) Cottafava, F. (U. Genoa, Italy), E. Fortuna and A. Fossati-uglielmoni. *Minerva Pediat.* 20(23):1196-1200, 968.

alignant tumors other than leukemia were found in 392/20,967 children under 16 yr. examined in the Pediatric Hospital of Genoa between 1950-1967, inclusive. Although most of these children came from southern Italy (particularly from Liguria), all of the provinces were represented in this pt. population; the male:female ratio was approx. 2:1, irrespective of tumor type. The tumors most frequently encountered were central nervous system tumors (CNS; 31%), Hodgkin's disease (15.5%) and Wilms' tumor + neuroblastoma (14%); the age group most frequently affected was from 0-5 yr. In 142 children in whom incidence was tabulated in terms of age, from 1 yr. or less to 15 yr., by yr., the absolute incidence in each group was 17, 12, 11, 14, 18, 8, 5, 8, 15, 7, 11, 6, 4, 3 and 4, resp. In 211 pts., the incidence by tumor type was: CNS = 60, Wilms' tumor = 30, neuroblastoma = 30, malignant teratoma = 5, other locations = 25, Hodgkin's disease = 30, lymphosarcoma = 15, reticulum cell sarcoma = 16. Although CNS tumors were found throughout childhood, the apparent peak ages were 5 and 8 yr., compared to 4 or 9 yr. in children with Hodgkin's disease and lymphosarcoma and 1 yr. in children with Wilms' tumor and neuroblastoma. As compared to the over-all incidence during the 18 yr. of the study, the incidence during the last 4 yr. (1964-1967, inclusive) increased 31%. (19 references)

69-629 EPIDEMIOLOGIC-STATISTICAL STUDIES ON THE FREQUENCY OF MALIGNANT TUMORS IN THE PROVINCE OF RAVENNA IN THE 5-YEAR PERIOD 1959-1963. (It.) Bisbini, P. (U. Bologna, Italy), G. Marzot, P. Cenni and N. Viscomi. *Ig. Mod.* 40(11,12):772-791, 1967.

Mortality rates/100,000 population in males, females and both sexes, resp., in 1959-1963 (inclusive) in the Province of Ravenna, Italy, were: all causes = 1064, 858 and 960, resp., and all cancers = 221, 182 and 201, resp. Cancer mortality rates by site were: stomach = 77, 57 and 67, resp.; intestinal = 13, 15 and 14, resp.; rectal = 8, 6 and 7, resp.; liver cancer = 15, 13 and 14, resp.; other g.i. = 14, 9 and 12, resp.; all g.i. and peritoneal = 126, 99 and 112, resp.; breast = 0.3, 18 and 9, resp.; genital = 24, 15 and 19, resp.; urinary tract = 11, 5 and 8, resp.; lymphatic and hematopoietic = 15, 10 and 12, resp.; buccal and pharyngeal = 7, 1 and 4, resp.; laryngeal, tracheal, bronchial and lung = 29, 8 and 17, resp.; other respiratory = 3, 1 and 2, resp.; total respiratory tract = 30, 9 and 19, resp.; other and unspecified sites = 17, 15 and 16, resp. The over-all cancer mortality rate (both sexes combined) was 17/100,000 population under 40 yr. of age, 454/100,000 for the population over 40, 201/100,000 for the total population. In inhabitants of Ravenna under 39 yr., the estimated probability of death from cancer (in terms of deaths due to all causes) was 22.5% in 1959-60 and 21.2% in 1962-63, compared to 14.3% and 16.1%, resp., in the over-74 age group. Analysis of the data by age groups showed an apparently stationary cancer mortality rate in the population under 40 yr. and an apparently increasing rate in persons over 40. Over-all mortalities from g.i. and oropharyngeal cancer were decreasing; all others were increasing. Cancer mortality was higher in men, with a peak (34.4% of all of deaths) in the 60-64 yr. age group; the peak cancer mortality rate in women (48.4% of all deaths) was seen at age 40-59 yr.

69-630 MASS CYTODIAGNOSTIC SCREENING FOR THE EARLY DIAGNOSIS OF UTERINE TUMORS IN THE PROVINCE OF RAVENNA. PRELIMINARY CLINICO-STATISTICAL INVESTIGATIONS: 1965-67). (It.) Marzot G. (U. Bologna, Italy), E. Sega and P. Cenni. Ig. Mod. 40(11,12):910-921, 1967.

From 1965-1967, Papanicolacu smears were obtained from 13,481 female residents of the Ravenna Province. In this group, the age distribution/1000 female population was 76.5 at age 20-29, 169.15 at age 30-39, 186.26 at age 40-49, 121.20 at age 50-59, 38.67 at age 60-69 and 6.74 at age 70 and over (total 110.46/1000 total female population), representing 21.63/1000 unmarried girls and young women, 151.01/1000 married women and 27.85/1000 widowed or separated women. Examination disclosed 10 uterine and 41 cervical tumors (73.34% in Grade I, 23.55% in Grade II), with 4 false negative, 5 false positive and 26 unsatisfactory smears. Of these tumors, 37/51 were non-infiltrating, 4/51 (all of the cervix) showed microinfiltration and 10/51 (5 cervical, 5 uterine) showed more advanced infiltration; about 20% of the tumors were entirely asymptomatic. The tumor incidence was 2/426 in unmarried girls and young women (4.69/1000), 43/12,512 in married women (3.44/1000) and 6/543 in widowed or separated women (11.05/1000); the age incidence/1000 was 2.29 at age 20-29, 2.45 at age 30-39, 2.96 at age 40-49, 6.46 at age 50-59, 8.21 at age 60-69 and 30.30 at age 70 and over; it was 2.24 in nulliparas, 3.06 in primiparis and 4.63 in multiparas, compared to 3.58, 4.89 and 4.26/1000 in women with histories of 0, 1 and 2 or more abortions, resp. Leukoplakia was seen in 42 women; the total incidence of leukoplakia and cancer was 3.12 and 3.78/1000, resp.

69-631 WILMS' TUMOR AND CONGENITAL ANIRIDIA. (E.) Fraumeni, J. F., Jr. (NCI, Bethesda, Md.) and A. G. Glass. JAMA 206(4):825-828, 1968.

Review of hospital records (1945-1967) from the Massachusetts Eye and Ear Infirmary and the Massachusetts General Hospital, the Wilmer Clinic of the Johns Hopkins Hospital, the Children's Hospital of the District of Columbia and the Washington Hospital Center revealed Wilms' tumor in 7/28 children (16 boys, 12 girls) under 4 with congenital aniridia (familial in 10, sporadic in 15, unknown type in 3), including 2 previously reported cases. This brings the total reported cases of Wilms' tumor with aniridia to 22. The frequency of aniridia in children with Wilms' tumor (6/440 in 1 study) is much higher than the estimated frequency of aniridia in the general population (1/50,000 to 1/100,000). The mean age at diagnosis of the tumor was 1.8 yr., compared to 3.6 yr. in children without aniridia; there seemed to be no sex preponderance. The natural history of the tumor was about the same in these pts. as in pts. without aniridia. Ocular defects other than aniridia were present in 6/7 of the authors' cases (microphthalmia in 1); non-ocular defects included mental deficiency (3), anomalies of the ears (4), growth retardation (2), genitourinary tract anomalies (2) and inguinal and umbilical hernias (2). Only 1/7 had a family history of aniridia. The abundance of defects concurrent with the Wilms' tumor-aniridia syndrome suggested that tumor development is proportional to expressivity of the basic defect. A single aniridia gene (known to be an autosomal dominant with high penetrance) with pleiotropic effects, or interaction between the genes for aniridia and Wilms' tumor, is suggested. In view of the high risk of Wilms' tumor in children with aniridia, particularly the sporadic type with other congenital defects, careful examination of such children is recommended.

69-632 RETINOBLASTOMA AMONG OFFSPRING OF ADULT SURVIVORS IN DENMARK. (E.) Nielsen, M. (State Hosp., Copenhagen) and E. Goldschmidt. Acta Ophthal. 46(4):736-741, 1968.

Between 1910-1945 (inclusive), 69 pts. were treated for retinoblastoma in 2 urban hospitals in Denmark; 13/69 were known to have died and 30 were followed up at age 22-57 yr. (mean 32 yr.; 18 men, 12 women). In 30/30, an absence of familial history of the disorder appeared to warrant a final diagnosis of sporadic retinoblastoma (unilateral in all pts.). At the time of follow-up (by questionnaire), 15/28 responding pts. (17 men, 11 women) had a total of 28 children (10/28 under 5 yr., 7/28 age 5-10 yr., 11/28 over 10 yr.); 8/15 families had 2 children each, 5/15 had 1 child and 1/15 (each) had 3 and 4 children, resp. Subsequent personal contact with each family confirmed that none of these 28 children had retinoblastoma. Combining the results with those of 6 other studies previously reported to the literature showed retinoblastoma in only 7/159 children (4.4%) of 81 pts. studied, suggesting that less than 10% of sporadic unilateral retinoblastomas represent genetic mutations, the remainder being phenocopies. The empirical risk factor of retinoblastoma in children of pts. with sporadic unilateral retinoblastoma does not exceed 15% at the 99% level of probability.

69-633 PREMALIGNANT DISEASES OF THE UTERINE CERVIX IN SOME MINORITY GROUPS IN OUR COUNTRY. (Bul.) Piperkov, T. (Postgrad. Med. Inst., Plovdiv, Bulgaria). Akush. Ginek. (Sofiia) 7(3):273-278, 1968.

The incidence of premalignant and malignant lesions of the cervix was studied by colposcopy in 308 Moslem and 411 non-Moslem women under 65 from 3 industrial areas of Bulgaria. Premalignant lesions were seen in 267/308 Moslems nd 239/411 non-Moslems; the incidence was 62.7% nd 57.6%, resp., in Kurdzhali, 68% and 64.1%, esp., in Smolyan and 63.2% and 49.3%, resp., in lovdiv. In women under 30, the incidence of prealignant lesions was 61.8% in Smolyan and 70-71.4% n the other 2 areas; in Moslem women it was 7.6% in Smolyan and 65.8-66.7% in the other 2 reas (these groups were all small). Malignant ervical lesions were seen in 10/308 Moslems and 2/411 non-Moslems; the cancer incidence was 5.3% n both groups in Smolyan, 1.1-1.3% in Plovdiv nd 1.9-2.5% in Kurdzhali. Of the pts. with caner, 3/22 (all Moslems) were under 30, 13/22 5/13 Moslem) were 31-45 and 6/22 (2/6 Moslem) ere 46-55 yr. old. Since the principal differnce between the Moslem and non-Moslem women was ircumcision of their husbands, and the difference etween these groups was small, it is suggested hat smegma contributes to the malignant transformation of premalignant lesions, but does not tself induce these lesions.

9-634 CARCINOMA OF THE UTERINE CERVIX. (E.) Agarwal, S. (Med. Coll., Jabalpur, India), . Vishnoi, V. N. Gandagule and S. S. Chouhan. ndian J. Cancer 5(1):123-126, 1968.

etween 1958 and 1966 a total of 623 cases of ervical carcinoma were recorded at the Medical ollege in Jabalpur, accounting for 20% of all umors, 40% of all tumors in females and 83.4% f female genital tumors in that region. Of a otal of 800 genital cancers detected in this eriod, 19 (2.4%) were of corpus uteri, 18% (2.2%) of the vulva, 19 (2.4%) of the vagina, 2 (0.3%) of the Fallopian tube, 68 (8.5%) of the vary and 7 (0.8%) trophoblastic. The age disribution was 0 in children under 10, 0.9% at ge 11-20, 19.2% at age 21-30, 41.2% at age 31-40, 8.4% at age 41-50, 8.8% at age 51-60, 1.3% at ge 61-70 and 0.2% at age 71+. Only 2.7% of the ts. were nulliparous but the number of children id not seem to affect incidence. In this series 6.7% were Hindus (who comprise 93% of population) nd 3.2% were Moslems (5% of population). Epidermoid carcinoma was present in 608/623 (97.6%) and adenocarcinoma in 15/623 (2.4%). Exophytic lesions were present in 62.2% of 106 pts. undergoing hysterectomy, endocervical growth in 16.9%, ulcerative lesions in 13.4% and no gross lesion in 7.5%; 16/66 examined pts. (24.2%) showed metastases to the pelvic lymph nodes. Cervical carcinoma during pregnancy was noted in 14 pts. (2.3%; 3/14 were associated with full-term pregnancy) and in 3 pts. (0.5%) with uterine prolapse. Other lesions of the female genital tract were noted in 23/106 pts. undergoing hysterectomy: leiomyoma (5), adenomyosis (6), endometrial polyp (1), dermoid cyst of ovary (2), hydrosalpinx (1), follicullar salpingitis (6) and pyometra (2).

69-635 LARYNX CARCINOMA IN YOUNGER PATIENTS. (Ger.) Faragó, L. (Cancer Inst., Budapest). Mschr. Ohrenheilk. 102(9):551-555, 1968.

Between 1960 and 1964 a total of 1379 pts. (1296 men, 83 women) with laryngeal carcinoma were reported in Hungary; 49/1379 (3.55%) were less than 39 yr. old, 40 (3.08%) men and 9 (10.84%) women. Between 1955 and 1964, 615 cases of larynx carcinoma were detected at the Otorhinolaryngology Department of the Cancer Institute in Budapest; 22/615 (3.57%; 21 male, 1 female) were less than 39 yr. old and 1 pt. was under 20. All of these pts. smoked, some heavily (more than 25 cigarettes/day) and 15/22 drank regularly (9 consumed large amounts of alcohol); 15/22 worked in industry, 5/22 in agriculture and 2/22 were white collar workers. All pts. were seen 1-2 mo. after appearance of the first symptoms; the histological diagnosis in all cases was keratotic squamous cell carcinoma. The tumors were located in the glottis in 2 pts. (Stage I, no metastases), supraglottically in 13 pts. (Stage II-III, 5 metastases) and in the extralaryngeal-hypopharyngeal area in 7 pts. (Stage IV, 7 metastases). Comparison of this group and previously described pts. led to the conclusion that carcinoma of the larynx among younger pts. is increasing.

69-636 BLOOD GROUPS IN PATIENTS WITH MALIGNANT TUMORS. (Rus.) Mering, L. G. (Petrov Res. Inst. Oncol., Leningrad, U.S.S.R.), M. P. Iakovleva and A. Kh. Andreeva. Vop. Onkol. 14(7):28-32, 1968.

In 70,870 normal subjects (data from several previously published Soviet studies), the blood group distribution was : type A in 37% (26,222), type B in 20% (14,174), type AB in 8% (5670) and type 0 in 35% (24,804). Blood group distribution was also studied in 2333 pts. with malignant and non-malignant diseases. In 530 pts. with stomach cancer, the frequency of group A was significantly increased at the expense of group 0 (40% and 31%, resp.); in 56 pts. with stomach ulcer, group 0 was significantly increased and group A was reduced (50% and 27%, resp.). In the pts. with stomach cancer, group A was most frequent in pts. with cancer of the gastric corpus (42%) and advanced cancer (54%). In 670 pts. with lung cancer and 171 pts. with non-malignant lung diseases, the frequency of group A was 39% and 44%, resp., compared to 35.5% and 26%, resp., in Group 0. The frequency of group A in pts. with cancer of the breast (551) and cervix (227) was 39.5% and 35.5%, resp., compared to 35% and 37.5%, resp., in group 0. In 128 pts. with non-malignant breast diseases, the group A and 0 frequencies were 37.5% and 31%, resp. The differences in the last 3 groups were not significantly different from normal.

69-637 Gc GROUP DISTRIBUTIONS IN PATIENTS WITH CANCER. (E.) Hughes, N. R. (Prince of Wales Hosp., Randwick, N.S.W., Australia). J. Nat. Cancer Inst. 41(2):303-313, 1968.

The distribution of the serum-specific autosomal codominant alleles Gc^1 and Gc^2 was about the same in 734 adults with cancer (302 men, 432 women) and 402 adult control subjects (including healthy volunteers and non-cancer pts. without histories of cancer or ulcerative colitis). Sera from pts. with breast carcinoma or malignant melanoma (66 men, 232 women) also showed no significant differences, but sera from 48 male pts. with other forms of ectodermal tumor showed a statistically significant increase of the Gc 2:2 phenotype as compared to males in the control population. This phenomenon was not observed in 23 women pts. with other forms of ectodermal tumor (compared to women in the control population). Among 117 men and 60 women with endodermal tumors, sera from the women pts. (only) also showed a significant increase of the Gc 2:2 phenotype (compared to female controls), as did 46 of the men and 37 of the women with colorectal cancer. A similar increase in the Gc 2:2 phenotype was seen in sera from 31 men and 94 women with mesodermal tumors not affecting the hematopoietic tissues, but not in 40 men and 23 women with tumors involving the hematopoietic tissues. In general (excluding pts. with breast cancer or melanoma), women pts. showed a significant difference from the expected distribution (based on the Hardy-Weinberg equilibrium), due to decreased frequency of incidence of the Gc 2:1 phenotype. A decrease of heterozygote frequency was also seen in women with tumors of the ectodermal, endodermal and hematopoietic tissues, but not in women with tumors of the mesodermal tissues.

69-638 DISTRIBUTION OF BREAST CANCER IN A GOITER DISTRICT OF NORTHERN BUKOVINA. (Rus.)

Zhivetskii, A. V. (Inst. Exp. Clin. Oncol., Moscow). Vrach. Delo 7:37-41, 1968.

An epidemiologic study of 175 female pts. with breast cancer (compared to 175 healthy female controls) showed a higher morbidity in North Bukovina (known as a goiter endemic region) than in the Ukrainian SSR as a whole, The incidence was higher in city dwellers (52% of the group) than among rural dwellers (48%) and the morbidity was highest in the age group 36-55 yr. (52%), in the pre- and early postmenopausal period. The left mammary gland was affected in 53.7%, the right in 44.6% and both in 1.7%; 88% of the tumors were typical nodular forms, mainly localized in upper external quadrant of mammary gland, and 64% were Stage I and II. Of the group with breast cancer, 62.9% were original inhabitants and 37.1% newcomers; 95.4% were married. Breast cancer was also associated with disturbed menstrual function, late marriage, incomplete sexual intercourse (52%), a small number of pregnancies (1-2 in 69.4%); with short (up to 10 mo.) lactation periods (51.8%) and tight clothing. The morbidity in the steppe regions of North Bukovina (where the soil cobalt level is high) was higher (35%) than in the mountains (4%) and premountainous regions (9%). The role of abortion or profession could not be established, but 24.1% were farm workers. "Familial cancer" was registered in 5.1%. Gynecological diseases were found in 19.4%, other diseases (such as lung tuberculosis, hepatitis, exanthematous fever) in 24.6%, endocrine diseases in 2.9%, inflammatory breast diseases during pregnancy and lactation in 28.1% and trauma in 1.7%. Although North Bukovina is a goiter region, most breast cancer pts. showed normal thyroid function. The relationship(s) between breast cancer morbidity and the levels of microelements and iodine in the soil, water and food products are discussed.

69-639 UROLOGICAL CANCER MORBIDITY IN LENINGRAD IN 1960-1966. (Rus.)

Martynenko, B. F. (City Oncol. Dispen., Leningrad, U.S.S.R.). Vop. Onkol. 14(8):40-43, 1968.

Examination of data from the Leningrad City Oncological Dispensary showed an increase in urological cancer morbidity from 3.1% to 4.8% (a 188.2% increase) of all malignant neoplasms in Leningrad from 1960 to 1966. The male:female ratio was 2:1. The distribution by site in 1960-1966 was: bladder 32.7%, kidney 29.9%, prostate 20.9%, testis 4.7%, retroperitoneal 3.7% and penis 1.0%. Av. morbidity in men (in parenthesis, the age group with the highest incidence) was: prostate, 31.6% (88% at age 60 and over); kidney, 24.3% (50-59 yr.; 90% at age 50 and over); bladder, 31.3% (50-59 yr.; 90% at age 50 and over); testis, 7.1% (30-39 yr., av. 38.3% of pts.); retroperitoneal 2.5% (60-69 yr.); adrenal, 0.4%; penis, 1.0% (50-59 and 70 or more yr., av. 26.9% of pts); other tumors were seen in only a few pts. In women, av. morbidity rates (ages as before) were: kidney, 48-60% (60-69 yr.); bladder, 19-39% (60-69 yr.); retroperitoneal, 3-9% (50 yr. or more); adrenal, 0.7-3.0%; and renal pelvis and ureter, 1.3%. Single cases of tumors of the urethra were seen only in 1962-1963 (2.0-2.3%). In the same observation period, kidney tumors were registered in 6 boys and 6 girls in the age group 0-9 yr. and in 3 boys and 1 girl, age 10-19 yr. Retroperitoneal tumors were seen in 1 boy and 1 girl aged 3 yr. and in 3 boys and 1 girl in the age group 9-19 yr.

69-640 LEAD TIME GAINED BY DIAGNOSTIC SCREENING FOR BREAST CANCER. (E.)

Hutchison, G. B. (Michael Reese Hosp. Chicago, Ill.) and S. Shapiro. J. Nat. Cancer Inst. 41(3):665-681, 1968.

A mass screening study (mammography and clinical diagnosis) for breast cancer was performed in women enrolled in a medical insurance plan in New York; 31,450 were enrolled, about 20,000 had gone through the first screening and 12,540 and about 3550 through 1 or 2 annual repeat examinations, resp., at the time of report. In unscreened controls (enrolled in the same insurance plan), clinical (biopsy confirmed) breast cancer was seen in 90/31,542 (1.6/1000/yr.), compared to 19/31,450 screened women (0.9/1000/yr.). Repeat examination at an av. interval of 14 mo. showed clinical breast cancer in 18/20,000 previously negative women (0.8/1000/yr.) and preclinical disease (later confirmed by biopsy) in 20/12,540 women (1.4/1000/yr.); the total incidence in these screened pts. was 2.2/1000/yr., compared to a preclinical disease incidence of 1.1 in unscreened women (20/16,209). The total incidence in women scheduled for screening but not examined (0.9/1000/yr.) was significantly lower than in the screened women (2.2) or the control group (2.2). The breast cancer and preclinical disease incidences estimated from the early results of this study were higher (1.6 and 2.2/1000/yr., resp.) than results of other studies (1.2-1.4 in 3 other studies); the chief distortion factor seemed to be selection bias. The estimated av. duration of preclinical disease (to the recognition of clinical breast cancer) is 20 mo.

69-641 BILATERAL CARCINOMA OF THE BREAST IN LIVING MOTHER AND DAUGHTER. A REPORT OF CASES. (E.) Smith, B. C. (63 E. 84th St., New York). Arch Surg. (Chicago) 97(4):590-591, 1968.

About 10.5 yr. after left radical mastectomy for a small apocrine duct carcinoma in an area of cystic mastitis, a 50-yr.-old woman underwent right radical mastectomy for a tumor of the other breast, apparently a second primary and not a metastasis (cellular carcinoma from the ductal epithelium). The pt. was alive and well 21 yr. after right mastectomy. About 10 yr. after this pt. underwent the second procedure, her daughter (age 44) underwent left radical mastectomy for infiltrating ductal carcinoma. About 1.5 yr. later, the pt. underwent right simple mastectomy for a small carcinoma in an area of cystic mastitis, which morphologically resembled the other tumor but was apparently not a metastasis. The pt. returned 9 mo. later with chest wall recurrences on the right mastectomy scar, bilateral pleural effusions and abdominal metastases identified as adenocarcinoma; at the time of report she was responding moderately well to therapy.

69-642 CANCER -CUSTOMS, HABITS AND USAGES AND ENVIRONMENT. (E.) Reddy, D. J. (Jawaharlal Inst. Post-Grad. Med. Ed. & Res., Pondicherry, India). Indian J. Cancer 5(1): 14-36, 1968.

A review (62 references) of etiologic and precipitating factors in carcinogenesis, with particular reference to India, includes a report that in 329/359 cases of cervical carcinoma, the male partner was uncircumcised. Smegma accumulations were 0 in only 30/173 evaluable uncircumcised partners (17.34%), 1 + in 59/173 (31.11%), 2+ in 35/173 (20.23%) and 3+ in 49/173 (28.32%). Comparable tabulations among 48 uncircumcised controls whose partners had not developed cervical cancer were 31.23%, 41.67%, 14.58% and 12.50%, resp. At the same hospital, 156/163 carcinomas of the penis seen over 6 yr. were in Hindus, 7/163 in Christians and 0/163 in Moslems. Of 59,735 female outpatients (age 20-70 yr.) seen at the Guntur General Hospital, 75.4%, 14.9% and 9.6%, resp., were Hindus, Moslems or Christians; of the 498 pts. with cervix cancer, however, 72.1% (359) were Hindus, 24.3% (121) were Christians and only 3.6% (18) were Moslems. In Swiss albino mice (age 43-119 days) treated by application of 4-10 mg dried human smegma to the cervical mucosa (1-2 doses every 5-7 days; total duration of treatment not stated), a variety of cellular hyperplasias developed, with cervical carcinoma in 4/33 in 1 group and 4/44 in another (mean dose 732 mg over 550 days). A review of 3528 autopsies at the Andhra Medical College between 1926-1964 showed that 54/481 malignancies (11.25%) were primary hepatomas, with postnecrotic or portal hepatic cirrhosis demonstrable in 4/54. The male:female ratio was 52:2.

69-643 PRIMARY CARCINOMA OF THE VAGINA. (E.) Ptáčková, B. (Oncol. Inst., Brno, Czechoslovakia). Neoplasma (Bratisl.) 15(3): 309-322, 1968.

From 1936-1960, 6471 women with genital carcinoma were treated at the Oncology Institute, Brno; 124/6471 (1.92%) had primary vaginal carcinoma. The ratio of primary vaginal carcinoma to primary carcinoma of the cervix, uterus, ovary and vulva was 1:35.6, 1:6.8, 1:6.9 and 1:1.9, resp. The age range in these 124 pts. was 27-82 yr. (av. 57.2; max. incidence at age 50-60); 19/124 (15.3%) had never been pregnant, 4/124 were nulliparas who had been pregnant and the other 101/124 (81.5%) had borne children. Family histories of gynecological cancer were reported by 3 pts. (2.4%) and family histories of other malignant diseases by 20/124 (16.1%). Other possibly contributing factors included vaginal prolapse (1/124) and carcinoma on a decubitus ulcer induced by a pessary (3/124). The prognosis was not affected by the age at diagnosis, the obstetrical history or tumor histology.

69-644 EPIDEMIOLOGY OF LEUKEMIA. (Rus.) Ponomarkov, V. I. (Inst. Exp. Clin. Oncol., Moscow), L. V. Orlova, I. P. Petrova and S. A. Khrustalev. Vop. Onkol. 14(8):51-53, 1968.

Several cases of leukemia in dogs and man (both sexes) are presented as data of interest in the epidemiology of leukemia. In the first case, 2 dogs (male and female) of the same owner developed reticulosis during close contact for 1 yr. In the second case, the owner of a female dog which died of reticulosis was hospitalized 5 mo. later with acute hemocytoblastic leukemia; this man's sister (who lived in the same household) had died 3 yr. earlier of acute leukemia. In the third case a female dog, brought into the house

1 yr. after the death of the owner's mother of chronic myeloid leukemia, also died of myeloid leukemia.

69-645 CONCERNING THE INCIDENCE OF "SPONTANEOUS" STOMACH CANCER IN Praomys (Mastomys) natalensis. (E.) Simmers, M. H. (California Coll. Med., Los Angeles), K. H. Ibsen and J. E. Berk. Cancer Res. 28(8):1573-1576, 1968.

A breeding stock of 5 male and 14 female African rodents (Praomys [Mastomys] natalensis) yielded a total of 60 animals (28 males, 32 females) maintained until death or sacrifice (age 8-27 mo.; 31/60 were 18-27 mo. old). Although previous reports indicated a relatively high incidence of spontaneous stomach cancer in this species, ranging from 8%-32% for females and from 28%-64% for males, careful macroscopic and microscopic studies of the stomachs of these animals, including the esophagus and duodenum, failed to disclose any stomach neoplasm or premalignant lesion. An ovarian granulosa cell tumor was found in 1/60 and an endometrial adenocarcinoma in 1/60. Trichobezoars (1-3/animal) were found in 52/60 animals (86%), usually in the glandular stomach but occasionally in the intestine, suggesting the possible adsorption of any ingested carcinogens. It is suggested that the difference in stomach cancer incidence between this stock and previously reported groups may result from genetic factors or genetically-determined hormonal factors, the expression of which may have been modified by environmental factors. The authors' colony received Purina Laboratory Chow (supplemented by sunflower seed in breeding females), whereas the previously reported animals were fed a mixture of peanut and corn meals, which may have been contaminated by aflatoxin-producing strains of Aspergillus flavus.

69-646 THYROID NEOPLASMS IN THE DOG. A CLINICOPATHOLOGIC STUDY OF FIFTY-SEVEN CASES. (E.) Brodey, R. S. (U. Pennsylvania, Philadelphia) and D. F. Kelly. Cancer 22(2): 406-416, 1968.

During a 15-yr. period, histologically confirmed neoplasms were found in 3520/75,000 dogs (approx. 5%) examined at a university veterinary hospital. Among these tumor-bearing animals, 57/3520 (1.6%) had thyroid tumors, including 30 males, 21 normal females and 6 spayed females. The male:female ratio in 28/57 with thyroid carcinoma was 16:12; in 29/57 with thyroid adenoma it was 15:14. Boxers accounted for 10/28 dogs with thyroid carcinoma and 13/29 with thyroid adenomas, although this breed represented only 7.3% of all dogs presented at the hospital. The mean age of the dogs with carcinoma and adenoma was 9.6 and 10.0 yr. (range 2.5-14.5 yr. and 4.5-18.5 yr.), resp. Metastases were found in 23/28 with carcinoma (12 lung, 6 jugular vein, 4 heart; 3 each brain and retropharyngeal lymph nodes, 2 each cervical or prescapular lymph nodes, pulmonary artery and liver; 1 each cranial vena cava, axillary, mediastinal or mandibular lymph nodes, kidney and parathyroid). Of the primary carcinomas, 14/28 were predominantly solid, 8/28 were solid + follicular, 3/28 were solid anaplastic, 3/38 were predominantly follicular and none was papillary. There was a considerable discrepancy between primary and secondary tumors in the same animal, solid primaries sometimes having predominantly follicular or mixed solid and follicular metastases. In 1 animal, a predominantly follicular pulmonary metastasis was adjacent to an intra-arterial tumor embolus which was entirely solid. In another, marked metaplasia was seen in a pulmonary metastasis, but not in the primary tumor. In the thyroid adenomas, hemorrhage into the tumor was frequent and seemed to be disproportionally large. Nodules of orderly thyroid tissue were found within the fibrous capsule, but failed to extend either through the capsule or into either veins or lymphatics.

69-647 ETIOLOGIC FACTORS OF BRONCHOPULMONARY CANCER. (Rum.) Pineles, S. (Inst. Oncol., Bucharest), V. Dragon, and E. Horodniceanu, Oncol. Radiol. (Bucur.) 7(1):19-24, 1968.

Etiologic factors in bronchopulmonary cancer (precancerous chronic states, environmental factors, atmospheric carcinogenic factors, occupational risks and smoking) are reviewed (47 references). Some statistics are given relating to 347 pts. with bronchial cancer treated in the Oncology Institute (Bucharest) in 1957-1965 inclusive: 61.4% were city inhabitants and 38.6% were rural residents (residential location is therefore significant); 20.7% had been active in occupations with carcinogenic risks and 40.7% had histories of various other pulmonary diseases preceding the diagnosis of cancer. The factor which seemed significant for all pts. was smoking (89.9% total: 93.9% of the men and 25% of the women); 98.1% had been smoking for over 10 yr.

69-648 INCIDENCE OF BRONCHOPULMONARY CANCER. (Rum.) Georgescu, D. C. (Inst. Oncol., Bucharest). Oncol. Radiol. (Bucur.) 7(1): 1-18, 1968.

Mortality rates/100,000 in Rumanian adults from all malignant tumors in 1935-6 were: total 43.3 (36.1 in men, 50.2 in women); urban population (UP) 99.8 (82.6 and 116.8, resp.); rural population (RP) 30.4 (25.3 and 35.2, resp.). In 1966, these rates were: total 118.2 (132.2 in men, 110.4 in women), increased 173% (266.2% and 120%, resp.); UP 129.0 (131.7 and 126.4, resp.), increased 29.3% (59.4% and 8.2%, resp.); RP 111.4 (126.9 and 96.8, resp.), increased 266.4% (401.6% and 175%, resp.). Bronchopulmonary cancer (BPC) mortality rates in 1935-6 were: total 1.9 (2.8 in men, 1.1 in women); UP 6.2 (8.3 and 4.2, resp.); RP 1.0 (1.4 and 0.4, resp.). In 1966,

C mortality was: total 17.3 (28.8 and 6.2,
esp.), increased 810.5% (928.6% and 463.6%,
esp.); UP 20.4 (33.1 and 7.8, resp.), increased
29% (298.8% and 85.7%, resp.); RP 15.3 (26.0 and
.3, resp.), increased 1430% (1757% and 1225%,
esp.). The highest regional incidence (27.0)
as in the Banat district of western Rumania,
ompared to 24.6 in Bucharest. The UP/RP differ-
nce in BPC mortality in 1966 was significant in
en, as was the mortality rate of stomach cancer
total 27.3; UP 28.4, RP 38.3). The UP/RP
ifference in BPC mortality in women was not as
igh. No significant residential differences in
tomach or uterine cancer mortality were seen in
omen (totals 20.5 and 24.1, resp.; UP 20.1 and
4.8, resp.; RP 38.3 and 23.6, resp.). The sex
ifference in BPC mortality increased with age
50-55% of men and 45-50% of women were 45-65 yr.
ld). Most BPC pts. were in high socioeconomic
roups. The increase in BPC in Rumania corre-
ponded to WHO data from other industrialized
ations.

9-649 PRIMARY CARCINOMA OF THE LIVER IN MEXICAN
ADULTS. (E.) Lopez-Corella, E. (General
osp. Mexico City), C. Ridaura-Sanz and J.
lbores-Saavedra. Cancer 22(3):678-685, 1968.

xamination of 6558 autopsies performed from
pril, 1953-December, 1966 at a hospital serving
he poorer neighborhoods of Mexico City and
nvirons disclosed 1877 cases of cancer (28.6%);
ncluding 1469 carcinomas and 37 primary liver
arcinomas (0.56% of all autopsies, 1.98% of all
alignant tumors, 2.52% of all carcinomas). The
istological diagnosis of the liver carcinomas
as cholangiocarcinoma in 7/37 and pure (26) or
ixed (4) hepatoma in 30/37 (a hepatoma:
holangiocarcinoma ratio of 30:7). The av. age
f pts. with hepatoma or cholangiocarcinoma was
2.4 and 54.0 yr. (range 25-66 and 33-88 yr.),
esp.; the male:female ratio in all liver cancer
ts. was 7:3. This low over-all incidence of
rimary liver cancer (comparable to the U.S.,
weden and other nations of Central and South
merica) was in marked contrast to the high inci-
ence of cirrhosis in this autopsy series (880/6558
13.4%); cirrhosis was classified as post-
ecrotic or posthepatitic in 549 pts. (62%) and
utritional or Laennec type in 271 pts. (29%).
irrhosis of the postnecrotic, posthepatitic or
iliary type was seen in 20/30 with hepatoma
13/20, 7/20 and 0/20, resp.) and 3/7 with
holangiocarcinoma (1/3 of each type); the
epatoma incidence in all cirrhosis pts. was
.27% (3.65% in pts. with postnecrotic and post-
epatitic cirrhosis). No cases of Laennec's
irrhosis with primary liver cancer were noted.
xamination of 35 consecutive cases of postnecrotic
irrhosis without liver cancer showed macronodular
lesions in 9/35, compared to 14/16 in pts. with
irrhosis and liver cancer. Since the most prev-
alent type of cirrhosis in Mexico is the fine
odular type (resembling Laennec's cirrhosis),
it is suggested that the development of liver carcinoma is related to the magnitude of nodular regeneration, which could partially account for the discrepancy between the cirrhosis and liver cancer frequencies in Mexico. The low incidence of liver carcinoma might also be explained by assuming that liver regeneration following liver damage is not vigorous.

69-650 PRELIMINARY REPORT ON DETECTION AND ELIMINATION PROGRAMME ON CERVICAL CANCER IN THE CAYMAN ISLANDS. (E.) Burrowes, J. T. (Nat. Cancer Cyt. Ctr., New York, N.Y.) and J. E. Ayre. Cancer Cyt. 8(1):9-12, 1968.

Papanicolaou smears done on 931/approx. 3000 adult women resident in the Cayman Islands (Jamaica) were evaluated as 102/931 Class I (normal), 706/931 Class II (inflammation), 49/931 Class III (dysplasia) 17/931 Class IV (carcinoma *in situ*), 50/931 atypical and 7/931 spoiled or improperly executed. The corresponding percentages were 11.0%, 76.0%, 5.2%, 1.7%, 5.4% and 0.7%, resp. Only 11/17 women with Class IV smears underwent subsequent cervical conization, which confirmed carcinoma *in situ* in 5/11, moderate to max. dysplasia in 4/11, acute cervicitis in 1/11 and polyposis with squamous hyperplasia in 1/11. Approx. 16.5% of the islands' population is of European descent, 16.5% of African descent and the other 67% of mixed racial origin; a distribution reflected in the study population.

69-651 A STUDY OF CLUSTERING OF CHILDHOOD LEUKEMIA BY HOSPITAL OF BIRTH. (E.) Klauber, M. R. (U. Utah Coll. Med., Salt Lake City). Cancer Res. 28(9):1790-1792, 1968.

Children born in California in 1958-1960 (inclusive) and dying of leukemia under age 5 yr. were identified by a search of the 1958-1965 death certificates for the entire United States. The hospital of birth was then determined by a search of birth certificates, California Tumor Registry files and, when possible, local hospital records. In the group of 247 children dying of leukemia identified (among approx. 1,000,000 children born during the period indicated) the hospital of birth was established for 234/247. There was no significant clustering in terms of either the hospital of birth or the time of birth in relation to any given hospital. It is suggested that previously reported clusterings may have been due to some insult or insults capable of triggering or activating a virus, rather than to the presence of a virus as such.

69-652 CANCER PROBLEMS IN LAGOS. (E.) Duncan, J. T. K. (Coll. Med. U. Lagos, Nigeria). W. Afr. Med. J. 17(4):96-101, 1968.

Between August, 1962-July, 1964 (inclusive), 286 non-white pts. (169 males, 117 females) were admitted to the Lagos (Nigeria) University

Teaching Hospital for treatment of malignant diseases. The male:female ratio (absolute numbers) by age was: 0-9 yr. = 14:15; 10-19 yr. = 19:7; 20-29 yr. = 25:11; 30-39 yr. = 23:13; 40-49 yr. = 25:28; 50-59 yr. = 30:19; 60-69 yr. = 24:15; 70-75 yr. and over = 8.7; age unknown = 1.2. The over-all estimated incidence was 21.5/100,000 population in Lagos (a seaport), compared to 45.0/100,000 in nearby Ibadan, which maintained an effective cancer registry, and 330.0/100,000 in the U.S.A. in 1947. The tumors most frequently encountered were liver cancer (24/169 men, 3/117 women), breast cancer (0/169 and 25/117, resp.), lymphoreticular and soft tissue sarcomas (14/169 and 8/117, resp.), cancer of the bladder (8/169 and 2/117, resp.) and tumors of the salivary glands (7/169 and 3/117, resp.). Primary carcinoma of the liver was predominant in males, with the highest incidence at age 20-29 yr. (6/24 cases); hepatocellular carcinoma was the most common histologic type. Histories of cirrhosis of the liver prior to the diagnosis of cancer were recorded in only 4/24. Bronchogenic tumors were comparatively rare (6/169 men, 1/117 women); 4/7 were epidermoid and 1/7 was a teratoma. Only 2 testicular tumors were encountered (both teratomas). Bladder tumors were predominantly squamous cell carcinomas, with schistosomiasis not reported in any instance. The Burkitt lymphoma was seen in 6/169 males and 5/117 females, resp.; the high tumor incidence in children was attributed to this tumor and the lymphoreticular diseases. As compared to nearby Ibadan, an inland city, a number of significant differences in relative ratio frequencies were indicated, some of which appeared to be sex-specific. Satisfactory explanations for these differences were not immediately apparent.

69-653 BULLOUS DISEASE OF THE LUNG AND BRONCHOGENIC CARCINOMA. (E.) Ettman, I. K. (V.A. Hosp, Memphis, Tenn.). Southern Med. J. 61(7):743-747, 1968.

See also abstract nos.: 443,449,467,468,469,495,554,555,560,561,608,663

-654 PROGRESSIVE CHANGES *IN VITRO* AND *IN VIVO* IN THE CHROMOSOMAL CONSTITUTION OF A MMARY TUMOR IN THE C3H MOUSE: (It.) Bertorello, (U. Sassari, Italy) and M. G. Vianello. *Tumori* (1-2):175-186, 1968.

llowing 120 passages *in vivo* in homologous fe- le C3H mice, 70% of a culture of cells of ttner's spontaneous mammary tumor (Culture A) longed to a stemline with 41 chromosomes, all locentric and morphologically normal. Except r 1 cell with 82 chromosomes, all the other toses seen were within the range of 38-43 chromo- omes. Following 123 passages *in vivo* (as above), other culture (Culture B) showed only 30% cells this stemline, with a range of 28-79 chromo- omes, still grouped to a significant degree ound the euploid number. At the time of a cond *in vitro* passage of Culture A, only 8% of e cells showed 41 chromosomes; the range was -90 with a tendency to group in the 68-79 nge, although a modal number could not be tablished. At the time of a second *in vitro* ssage of Culture B, only 4% of the cells showed chromosomes and the ideogram showed a pre- lence of mitoses with 77-81 chromosomes. After 5 or 6 *in vitro* passages of Culture A, a modal mber of 77 chromosomes was established (seen in % of the mitoses), with a range of 65-83. The er-all morphology of the cells did not change gnificantly during successive cultures, showing mixture of fibroblastic and epithelioid char- teristics. None of the mitoses showed "double nute," marker metacentric or telocentric chromo- omes of unusual size or shape. The mechanisms sponsible for these successive changes *in vitro* re not clear.

9-655 PROGRESSIVE CLONAL CHANGES IN THE KARYOTYPE OF THE NEOPLASTIC CELL IN A LEURAL EFFUSION SECONDARY TO MAMMARY ADENO- RCINOMA. (It.) Castoldi, G. L. (U. Ferrara, taly), G. L. Scapoli and R. Spanedda. *Tumori* 1(1-2):3-22, 1968.

romosomal analysis was made of cells derived rom the sediments of aspirations of a pleural ffusion from a pt. with a unilateral adeno- rcinoma of the breast, before treatment (pre- aration #1), 37 and 74 days after the beginning f treatment with cyclophosphamide (2.4 and 3.8 in 2 courses; preparations #2 and #3) and at 2 dditional 37-day periods thereafter (preparations 4 and #5). A modal chromosomal number could ot be established in the preparations #1, #4 nd #5; in preparations #2 and #3 it was 61 and 2, resp. In #1, there was a tendency to group round 60-65. In preparations #1 through #4, 1.3-100% of metaphases showed 2 giant marker hromosomes, compared to 40% in #5. An additional, ery small marker chromosome was demonstrable in .3%, 36.3%, 39.5%, 13.0% and 0.0% of prepara- ions #1 through #5, resp., following the same pattern of increase and decrease as that shown by the 2 large markers. The progressive effects of chemotherapy were seen in the successive preparations, in terms of cell fragmentation and other changes. It is suggested that chemotherapy may have exerted a selective effect on cytogenesis, favoring the survival and propagation of a tumor stemline.

69-656 ULTRASTRUCTURAL STUDIES IN WILMS'S TUMOR. (E.) Balsaver, A. M. (U. Texas M. D. Anderson Hosp., Houston), C. W. Gibley and C. F. Tessmer. *Cancer* 22(2):417-427, 1968.

Light and electron microscopic examination of 3 surgical specimens of Wilms' tumor (nephroblastoma) showed connective tissue elements composed of spindle cells resembling fibroblasts and epithelial tissue consisting either of primitive epithelial cells clustered into "nests" or tubules lined by cuboidal epithelium, resembling normal proximal tubules. Two of the tumors showed glomeruloid structures containing a PAS-positive basement membrane. They lacked blood cells, capillary lumina or mesangial cells, but were composed of epithelial cells exhibiting features of normal podocytes possessing short, irregularly oriented cytoplasmic foot processes. In 1 tumor, further epithelial differentiation to form true glomeruli with capillary lumina and endothelial cells was noted. These ultrastructural observations suggested epithelial differentiation toward structures normally formed by metanephrogenic blastema, indicating that Wilms' tumor arises from undifferentiated metanephrogenic tissue.

69-657 FURTHER STUDY ON THE INFLUENCE OF PRIMIPAROUS AGE AND LITTER NUMBER ON THE MAMMARY TUMOR AGE IN MICE. (E.) Nagasawa, H. (Nat. Cancer Ctr. Res. Inst., Tokyo), M. Fujimoto and K. Kuretani. *Gann* 59(3):217-222, 1968.

Equations to calculate the influence of reproductive history (primiparous age, litter size, breeding period before tumor development) on spontaneous mammary tumor development were derived and the relative importances of various factors were calculated on the basis of data from 49 inbred C3H/He and 100 Swiss albino female mice. In these 2 groups, the mean primiparous age was 110.0 and 115.7 days, resp., the mean litter size was 3.8 and 3.9, resp., the breeding period before tumor development was 105.1 and 114.0 days, resp., and the mean tumor age was 7.2 and 7.6 mo. (corrected, 6.2 and 6.5 mo.), resp. The relative importances of primiparous age, litter number and the "rest factors" (not defined) in determining tumor age in C3H/He mice were 27.4%, 45.8% and 26.8%, resp., compared to 17.2%, 43.8% and 39.1%, resp., in Swiss mice.

A significant correlation was seen between high primiparous age, small litters and short breeding period until tumor development. Data from linear regression equations suggested that the tumor age could be prolonged by about 0.2-0.3 mo. if the primiparous age was delayed by 10 days, and by about 0.8 mo. if litter size increased by 1.

69-658 PRELIMINARY NOTE ON THE RELATIONS BETWEEN REGENERATIVE GROWTH, AGEING AND TUMOR FORMATION IN THE MOUSE LIVER. (E.) Hollander, C. F. (Netherlands Cancer Inst., Amsterdam). Epatologia 13(2):447-454, 1967.

The cumulative effects of aging and regeneration within the same liver lobes were shown by an increased frequency of nuclear inclusions and polyploidy in regenerated livers of aged mice (24 mo. old) after partial hepatectomy at age 3-16 mo. In 1 experiment in male CBA mice, the hepatoma incidence at age 23.5 mo. increased from 2/8 (intact controls) to 7/12 after partial hepatectomy at age 16 mo., but these results were not duplicated in another, similar experiment. Similar studies in small groups of $(C57BL \times CBA)F_1$ mice suggested a reduced hepatoma incidence in partially hepatectomized females and no significant change in males.

69-659 CHROMOSOMAL ABERRATIONS IN CANCER CELLS. STATISTICAL REGULARITIES IN THE VARIATION OF THE NUMBER OF ABERRATIONS IN HEP-2 CELL CULTURES. (Rus.) Poriadkova, N. A. (Inst. Med. Radiol., Obninsk, U.S.S.R.), E. G. Kuz'mina and N. V. Luchnik. Vop. Onkol. 14(8):82-88, 1968.

Among 7319 anaphase and telophase figures of HEp#2 cells, 990 (13.5%) cells showed chromosomal aberrations, including 355 (4.9%) with bridges (av. 1.18 bridges/cell) and 650 (8.9%) with fragments (1.81 fragments/cell) (total) 419 bridges = 5.7/100 cells; total 1177 fragments = 16.1/100 cells). The variation in the number of chromosomal aberrations and fragments was significant but the variation in the number of bridges was not. No correlation between the different criteria of cytogenetic damage was found. In the studied cell population, bridges were found independently of fragments. These cells and other strains studied displayed significant, uncontrolled variations in the percentage of chromosomal aberrations. Studies of the regularity of this variation led to the hypothesis that tumor cells show hidden damage of the genetic apparatus, which appeared in the form of chromosomal aberrations under certain conditions.

69-660 AUTORADIOGRAPHIC INVESTIGATION OF DNA SYNTHESIS IN THE CHROMOSOMES OF THE JBK ASCITES SARCOMA. (E.) Sellyei, M. (U. Med. Sch., Budapest, Hungary.). Acta Morph. Acad. Sci. Hung. 16(1):115-119, 1968.

White mice with 10-12-day-old JBK ascites sarcoma were admin. ^{3}H-thymidine (70 µC i.p.) and chromosomal DNA synthesis was studied in the tumor cells 6-14 hr. later. The mitotic rates after 6, 10 and 14 hr. were 0.5%, 18% and 38%, resp., indicating label uptake only in the late stages of DNA synthesis. Most of the minute chromosomes of the tumor cells were labeled. Label uptake by the telocentric chromosomes (including the type A marker) was higher in the distal areas than in the proximal areas (near the centromere), indicating late DNA replication in these areas; since label uptake is higher in the proximal areas of telocentric chromosomes of normal mouse cells, it is suggested that this change is characteristic of the JBK sarcoma. In the constricted portion of the mediocentric type B marker, label uptake was low near the centromere, suggesting that this chromosome arises from translocation of 2 telocentric forms.

69-661 CHROMOSOME EVALUATION IN FAMILIAL POLYPOSIS OF THE COLON. (E.) McConnell, T. S. (U. New Mexico Sch. Med., Albuquerque) and L. Parsons. Rocky Mountain Med. J. 65(9):51-53, 1968.

A review (15 references) of the history, proposed etiology, clinical symptoms and management of familial polyposis of the colon and rectum concludes that the disorder is almost invariably a prelude to development of colorectal carcinoma or adenocarcinoma, which can be prevented only by total colectomy. Chromosome morphology was studied in peripheral blood cultures obtained from 4 male members of an affected family: a man with polyposis and adenocarcinoma (on microscopic examination), his brother (polyposis only), 1/3 of a family of his affected sons (polyposis) and 1/7 of his unaffected sons (free of the disorder at age 14 yr.). In all cases the chromosomes studied were entirely normal, both numerically and structurally.

69-662 SIZE VARIATION OF THE LATE-REPLICATING X CHROMOSOME IN POLYCYSTIC OVARIAN DISEASE. (E.) Bamford, S. (Tufts U. Sch. Med., Boston, Mass.), G. W. Mitchell, Jr., A. Sperber and J. David. Acta Cytol. (Balt.) 12(4):283-289, 1968.

The late-replicating X chromosome was measured by autoradiography in peripheral blood cultures from 7 normal women, 5 women with untreated cancer (breast or endometrial adenocarcinoma and cervix carcinoma in situ), 5 women with typical polycystic ovarian disease (PD) and 4 women with variant forms of PD (3/4 with normal or small ovaries, fibrotic capsules, few subcapsular cysts and adenomatous endometrial hyperplasia; 1/4 with typical polycystic ovaries, adenomatous endometrial hyperplasia and carcinoma in situ of the cervix). In both typical and variant PD, the range of centromere indices of the late-replicating X chromosome was wider than in cells from cancer pts. (intermediate values) or controls. In histograms of ranks, cells from pts. with carcinoma and (to a lesser extent) variant PD showed a significant tendency towards the lower numbers (the larger chromosomes), which was significantly different from values seen in cells from controls or pts. with typical PD. No correlation between rank and centromere index was seen in any of the groups. The relative size of the late-labeled X chromosome was significantly greater in pts. with carcinoma or PD than in controls. A significant difference in rank, but not in centromere index, was seen between the typical and variant PD cases, with a similarity in rank between cells from pts. with carcinoma and variant PD. It is pointed out that a significant number of women with histories of anovulation develop endometrial carcinoma at an early age.

69-663 DOWN'S SYNDROME: VARIATION OF LEUKEMIA OCCURRENCE IN INSTITUTIONALIZED POPULATIONS. (E.) Jackson, E. W. (California Dept. Pub. Health, Berkeley), J. H. Turner, M. R. Klauber and F. D. Norris. *J. Chronic Dis.* 21:247-253, 1968.

In a 10-yr. study (1952-1962) conducted in 7 California state hospitals for the mentally retarded, the death rate among 2100 mongoloid pts. under 70 was 269/12,449 pt.-yr., approx. 16 times the normal expectancy (17.3). The greatest increase over expectancy was in the age groups 0-4 and 5-9 yr., both with an increase of over 50-fold was observed (observed, 90/1193 and 66/2893 pt.-yr.; expected, 1.7 and 1.3 resp.). Leukemia accounted for 5/269 deaths (expected 0.426), an increase of approx. 12-fold over normal age-specific rates in the 1960 population of California. All 5 pts. with leukemia were in the 5-9 yr. age group (4/5 were boys); 5/5 had lymphatic leukemia (3/5, acute). Other cases of cancer in mongoloids during the same interval included an 8-yr.-old girl (karyotype XXX trisomy-21) with retinoblastoma (alive in 1962), a 5-yr.-old girl with teratoma of the oviduct, a 38-yr.-old woman with an unspecified breast cancer and a 36-yr.-old man with testicular seminoma (alive in 1962). The absence of leukemia at age 10 yr. and over during this study period was attributed to the relatively small number of person-yr. at risk, but since the end of the study, 1 additional leukemia death in a mongoloid adult was reported (a 25-yr.-old woman). Since leukemia deaths in a previously reported mongoloid population in Pennsylvania exceeded normal expectancy by 61-fold (compared to 12-fold in this California group), it is suggested that leukemia in mongoloid pts. may depend on an interaction of environmental factors with the genetically determined chromosomal aberration.

69-664 LARGE ABNORMAL ACROCENTRIC CHROMOSOME ASSOCIATED WITH HUMAN MALIGNANCIES. POSSIBLE MECHANISM OF ESTABLISHING CLONE OF CELLS. (E.) Goh, K. (Oak Ridge Ass. U., Tenn.). *Arch. Intern. Med. (Chicago)* 122(3):241-248, *1968*.

An abnormally large acrocentric chromosome, previously observed in a group of pts. in acute transformation of chronic myeloid leukemia (CML), was found in cells from 6 adults (3 men, 3 women, age 27-69 yr.) with reticulum cell sarcoma (1), disseminated leukolymphosarcoma (1), CGL in an early stage of acute transformation (1) and malignant melanoma (3). The frequency of incidence of this abnormal chromosome varied from 1 pt. to another (each specimen from all pts. showed at least 1 of them) and also among the multiple specimens from each pt.; the highest incidence was found in metaphases obtained from direct tumor preparations and the lowest in the bone marrow and peripheral blood WBC cultures of pts. with malignant melanoma. Several clones of cells were found in the pt. with reticulum cell sarcoma; only 3/70 metaphases showed a normal karyotype and 4/7 of the 46-chromosome metaphases showed a pseudodiploid pattern. The modal chromosomal number in this pt. was 48, with the most consistent karyotype having 2 additional chromosomes in the C group, 1 in group D and 1 abnormal acrocentric chromosome. In these metaphases, 2 of the G chromosomes were missing and 17/70 karyotyped metaphases showed 1 or more acentric fragments. It is suggested that this abnormal chromosome may have been formed by (a) translocation of a chromosomal fragment to a normal G or D chromosome, (b) inversion of 1 of the arms of a B or C chromosome, (c) deletion of an arm of an A, B or C chromosome, or (d) an entirely new unit of chromosomal DNA of unknown origin. However, the most likely explanation was thought to be that of chromosomal breakage followed by a translocation as above and leading to a nondisjunction in mitosis.

69-665 CHROMOSOME STUDIES IN POTENTIALLY LEUKAEMIC MYELOID DISORDERS. (E.) Jensen, M. K. (State Hosp., Copenhagen). *Acta Med. Scand.* 183(6):535-542, 1968.

The karyotypes of bone marrow cells from 15 unselected adult pts. with polycythemia vera (6), myelofibrosis (3), idiopathic thrombocythemia (2), aplastic anemia (2) and pancytopenia (2) were studied; 4/15 had previously received cytotoxic agents or radiotherapy, while 11/15 were untreated or had received corticosteroids or anabolic steroids. The karyotypes were normal in 13/15; 1/13 died after 5 mo. of unspecified causes, while 12/13 were alive without signs of acute leukemia after 5-66 mo. Hyperdiploid karyotypes were seen in the other 2 pts. In 1/2 (with myelofibrosis), about 60% of the bone marrow metaphases contained 48 chromosomes, with 2 supernumerary chromosomes in Group C; this pt. was without signs of acute leukemia 1 yr. later. The other pt. apparently had myelofibrosis progressing rapidly to acute leukemia (he failed to respond to splenic irradiation + busulfan and died about 6 mo. after the onset of symptoms). Chronic myeloid leukemia was suggested by the very high WBC, but the Ph^1 chromosome was absent. About 80-95% of the bone marrow metaphases from this pt. showed 47 chromosomes, with 1 supernumerary chromosome in group C; peripheral blood cultures showed 2 stemlines, 1 of this karyotype and 1 normal diploid line. Evidence that chromosomal abnormalities may develop in both the granulocytic and erythrocytic precursors in the bone marrow is presented. It is suggested that myeloid diseases with abnormal chromosome stemlines should be considered malignant.

69-666 STUDY OF CERTAIN MECHANISMS OF ACTION OF THE HYPOTHALAMUS ON TUMOR GROWTH. (Rus.) Bordiushkov, Iu. N. (Oncol. Inst., Rostov-on-Don, USSR). Biull. Eksp. Biol. Med. 65(6): 68-71, 1968.

Tumor stimulation by electrical hypothalamic stimulation (HS; from permanent intrahypothalamic electrodes implanted 3 days before tumor inoc.) was studied in rats (tumors were examined 17 days after HS was begun). HS increased the size of 1-wk.-old Sarcoma 45 from 13.6 (controls) to 26.4 cm^3. Adrenalectomy (5 days before tumor inoc.) reduced the tumors (9.05 cm^3) while HS partially blocked this response (10.0 cm^3). The other experiments were performed in rats with RS-1 hepatoma. In untreated controls, av. tumor wt. was 8.0-8.1 g (15.8 cm^3) at the end of the experiment. HS stimulated the growth of 1-, 5- and 10-day-old tumors (av. 14.2 g, 10.0 g and 28.9 cm^3, resp.). Amphenone (10 mg x 10 p.o.) slightly inhibited 10-day-old tumors and HS did not significantly modify this effect (av. 15.2 and 15.8 cm^3, resp.). Sarcolysin (2 mg/day x 10 i.p.) inhibition of 12-day-old tumors was blocked by HS (av. 2.2 and 6.1 g, resp.). In rats with 5-day-old tumors admin. DNase or RNase (70 mg x 5 i.v.), av. final tumor wt. was 9.0 and 5.7 g, resp.; addition of HS resulted in an av. tumor wt. of 12.2 and 5.2 g, resp. Methylthiouracil (10 mg/day x 10 p.o.) alone or + HS, stimulated 5-day-old tumors (av. 9.5 and 11.3 g, resp.). The responses to HS did not vary according to the site of the implanted electrodes. It is concluded that HS stimulation of tumor growth is mediated by the adrenal cortex, its biochemical mechanism being ribosomal protein synthesis.

69-667 GLUCOSE-6-PHOSPHATE DEHYDROGENASE AND THE HISTOGENESIS OF EPIDERMOID CARCINOMA OF THE CERVIX. (E.) Park, I.-J. (Johns Hopkins U. Sch. Med., Baltimore, Md.) and H. W. Jones. Amer. J. Obstet. Gynec. 102(1):106-109, 1968.

Vertical starch gel electrophoresis for the determination of variants of glucose-6-phosphate dehydrogenase (GPD) was performed on samples of peripheral blood, normal cervical squamous epithelium and (when applicable) cervical cancer tissue from 10 Negro women heterozygotic for X-linked GPD electrophoretic polymorphism, without cancer of the cervix (controls) and 8 similarly heterozygotic, untreated Negro women with invasive epidermoid carcinoma of the cervix. In the control group, 9/10 subjects showed 2 bands in both blood and cervical tissue samples; 1/10 (with squamous metaplasia of the cervix) showed only 1 band in the epithelial sample but 2 in the blood sample. The ratio of enzyme content (A:B) ranged from 80:20 to 20:80 in the control subjects. In the cancer group, 5/8 showed only 1 band in the cervical tissue sample (1/5 was band A; 4/5 were band B) but both bands were seen in the blood sample; 1/8 showed A and B bands of equal intensity in the tumor sample (analysis of the blood sample is not reported); 1/8 showed a very dark B and much lighter A band in the tumor sample, with bands of equal intensity in the blood sample; and 1/8 showed only an A band and a variant of the same, in both tumor and blood samples. In these last 3 pts., cervical samples contained substantial amounts of normal epithelium and stroma, which was not true of samples derived from the other 5 cancer pts. In 1 pt., electrophoresis of a vaginal wall metastasis specimen showed a single band resembling the primary tumor. The findings were not inconsistent with the theory that epidermoid carcinoma of the cervix arises from a single cell. It is also concluded that the Lyon phenomenon may operate in at least some of the tumor cells.

69-668 INFANTILE CHORIOCARCINOMA: A CHARACTERISTIC SYNDROME. (E.) Witzleben, C. L. (St. Louis U. Med. Sch., Mo.) and G. Bruninga. J. Pediat. 73(3):374-378, 1968.

Typical choriocarcinoma was identified clinically and histologically in an infant girl, who died at age 6.5 wk. Autopsy showed choriocarcinoma involving the liver and lungs, with 1 metastasis in the frontal lobe of the brain. No primary or secondary ovarian tumor could be demonstrated and there was no evidence of a primary tumor or teratoma elsewhere in the body. Serum human chorionic gonadotropin (HCG) levels in the infant were distinctly elevated, but the mother's HGC levels were normal and no abnormal symptoms were seen at this time or at a repeat examination 3 mo. postpartum. However, 2.5 mo. later the mother developed widespread choriocarcinoma (liver, lung and small intestine metastases) and markedly elevated HCG titers. It is concluded that choriocarcinoma arose in the placenta and metastasized to the infant, the mother showing relatively delayed metastases from the same primary source.

69-669 SUPRASELLAR GERMINOMAS. (E.) Simson, L. R. (U. Michigan, Ann Arbor), I. Lampe and M. R. Abell. Cancer 22(3):533-544, 1968.

abetes insipidus was seen as a presenting symp- om in 8/10 children with suprasellar germinomas boys, 5 girls, age 6-16 yr.). The clinical agnosis was craniopharyngioma in 6/10, supra- llar neoplasm in 3/10 and glioma of the optic erve in 1/10. Visual defects were demonstrable 10/10; hypopituitarism in 2/10; abnormal ectroencephalograms in 4/10; elevated cere- rospinal fluid (CSF) protein in 4/10 (accompanied lymphocytic pleocytosis in 3/4); xanthochromia the CSF in 1/10; abnormal pneumoencephalogram 5/10 and an abnormal arteriogram or abnormal ntriculogram in 1/10 (each). Also reported is 23-yr.-old woman with visual disturbances, eriods of somnolence, headache, diabetes insipi- us, elevated protein and lymphocytic pleocytosis the CSF and an abnormal pneumoencephalogram. e histological diagnosis of 9/11 tumors was ure germinoma with the same structural and tological characteristics as germinomas of the estis, ovary, retroperitoneum and mediastinum. e other 2/11 had 2 separate foci of intracranial ure germinoma; 1/2 (the woman) showed auto- hthonous neoplasms in the suprasellar area and ineal gland, while 1/2 showed a suprasellar erminoma and a probably metastatic tumor in the arasagittal area of the parietal lobe. It is oncluded that the same types of germ cell neo- lasms (germinoma, embryonal carcinoma, teratoma nd choriocarcinoma) occur as pure types and in arious admixtures within the cranial vault as are ound in the gonads; evidence for their origin rom intracranial germ cells is presented.

-670 THE DEVELOPMENT OF MALIGNANCY IN OLIGODENDROGLIOMAS. (E.) Barnard, . O. (Maida Vale Hosp., London). J. Path. Bact. 6(1):113-123, 1968.

eview of over 1400 brain tumor biopsy specimens xamined over 12 yr. showed oligodendrogliomas n about 8% of all glioma specimens. The rela- ionship between tumor histology and the clinical ourse is illustrated by 6 pts. (2 men, 4 women; ge 32-54 at diagnosis). In 1/6, the oligo- endrogliomatous elements remained typical but he disease progressed rapidly, because of probably) secondary proliferation of astroglial lements resembling glioblastoma multiforme. his pt. was the manager of a cathode ray tube actory. In the other 5 pts., the malignancy of he tumor depended on its oligodendrogliomatous ontent and was directly dependent on the degree f cellular dedifferentiation to anaplasia. In /5, a woman with a history of multiple sclerosis nd a spinal cord neurofibroma, the clinical ourse was brief and deterioration was rapid. n the other 4 pts., the tumor remained relatively tationary for 4-6 yr. (3/4) or 18 yr. (1/4) efore rapidly progressing. It is suggested hat some primary tumors of the glioblastoma ultiforme type, containing no astrocytic ele- ents, may develop from malignant degeneration f an oligodendroglioma.

69-671 ATROPHY AND REGENERATION IN THE PATHOGENESIS OF PROSTATIC CARCINOMA. (E.) Liavåg, I. (Ulleval Hosp., Oslo, Norway). Acta Path. Microbiol. Scand. 73(3):338-350, 1968.

In consecutive autopsy material from 340 men over 40, 90 cases (26.5%) of clinically unsuspected (latent) prostate carcinoma were found (87 were included in this study); the frequency increased with age from 8% at age 40-50 to 46.7% at age 80-90. Atrophy was present in 100% of carcinomatous and 90.3% of non-carcinomatous prostates, being localized in all but 4 cases. Atrophy increased with age (significantly higher for pts. over 70) and was more severe in carcinomatous than non-carcinomatous prostates. Marked atrophy was present in 85% of prostates with carcinoma and 49% of prostates without carcinoma. Examination of atrophic glands revealed aggregates of active cells, which protruded into or through the fibrous stroma surrounding the atrophic gland, forming solid buds. Small alveolar proliferations originated from these buds. They displayed a structure similar to the immature prostatic epithelium of infants and small alveolar carcinomas. The occurrence of these small alveolar proliferations in prostates with carcinoma was higher (93.1%) than in prostates without carcinoma (70%), their frequency increasing with age. They were more marked in the carcinomatous (66% marked proliferation) than non-carcinomatous (30% marked proliferation) prostates. In 40/87 cases (46%), atrophy, small alveolar proliferations and carcinoma were found side by side or intermingled in the same areas; in 32/87 (36.8%), the alveolar proliferations were morphologically indistinguishable from acini of the surrounding carcinoma; in 9/87, atrophy and small alveolar proliferation were separate from the carcinoma and 6/87 showed atrophy but no small alveolar proliferation. It is suggested that the carcinoma originated during atrophy, growth being induced by a regenerative stimulus with formation of undifferentiated acini (small alveolar proliferations) from which frank carcinoma developed.

69-672 PROGNOSIS OF CARCINOMA OF THE LIP OR TONGUE IN RELATION TO MENTAL STRESS: SPECULATION ON AN ANOMALOUS FINDING. (E.) Sutton, P. R. N. (U. Melbourne, Australia). Med. J. Aust. 2(7):312-313, 1968.

69-673 AUTOMATIC CHROMOSOME ANALYSIS. (E.) Rutovitz, D. (Med. Res. Council, London). Brit. Med. Bull. 24(3):260-267, 1968.

69-674 CONTROL BY ESTROGEN OF GENETIC TRANSCRIPTION AND TRANSLATION. (E.) Hamilton, T. H. (U. Texas). Science 161(3842): 649-661, 1968.

AUTHOR INDEX

ell, M. R. 669
damo, F. 553
dams, E. A. 541
dams, E. V. 584
garwal, S. 634
hluwalia, H. S. 620
lbores-Saavedra, J. 649
lessandri, M. 489
lexander, F. 618
mend, D. L. 517
mos, D. B. 457
nderson, L. J. 608
nderson, R. E. 544
ndreeva, A. Kh. 636
nsari, I. H. 487
ponte, G. E. 481
rber, W. 464
tchison, R. W. 545
vellán, L. 508
yre, J. E. 650
yres, J. L. 517
zar, H. A. 557

acon, H. E. 613
aker, C. P. 472
alsaver, A. M. 656
amford, S. 662
ank, A. 525
arbieri, D. 607
arnard, R. O. 670
arski, G. 607
ashirov, M. Sh. 609
eliaev, Iu. A. 485
enassi, E. 471
enjamin, B. 503
erezovskii, B. S. 476
ergolz, V. M. 556
erk, J. E. 645
ertorello, G. 654
hattarcharya, B. 615
iancifiori, C. 493,494
iozzi, G. 601
isbini, P. 629
luth, I. 482
ordiushkov, Iu. N. 666
orges, C. C. 610
radbury, J. T. 617
Braun, W. 464
Breine, U. 508
Bresciani, F. 453
Brett, G. Z. 503
Brode, E. 527
Brodey, R. S. 646
Brookes, V. S. 611
Bross, I. D. J. 502
Brown, E. V. 497
Brownlie, B. E. W. 478
Bruninga, G. 668
Bucciarelli, E. 493,494
Bukhtoiarova, E. M. 485
Burka, B. 577
Burmester, B. R. 580,581
Burrowes, J. T. 650

Bushar, H. F. 579
Butler, J. J. 571

Camus, J.-C. 473
Carter, L. P. 541
Castigliano, S. G. 506
Casto, B. C. 545
Castoldi, G. L. 655
Cenni, P. 629,630
Chang, L. M. S. 588
Chatterjee, R. 615
Chauvergne, J. 515
Chieco-Bianchi, L. 597
Chirigos, M. A. 572,577
Cho, Y.-J. 496
Chouhan, S. S. 634
Cirillo, R. 471
Clapp, N. K. 531
Cohen, D. 560
Collins, T. F. B. 535
Connor, G. H. 559
Cooper, M. D. 580,581
Conen, P. E. 455
Coppleson, M. 468
Corda, G. 553
Costa Carvalho, M. R. 626
Cottafava, F. 628
Craig, A. W. 531
Cramer, F. 464
Crighton, G. W. 563

David, J. 662
De, P. 615
De Barbieri, A. 570
de Barros Coelho, R. 626
De Capoa, A. 525
de Carvalho, A. R. L. 626
De Grouchy, J. 452
de Harven, E. 591
De Nava, C. 452
Dent, P. B. 580,581
De Pasqualini, C. D. 542
De Ratuld, Y. 583
De-Thé, G. 603
Dettmer, C. M. 481
Dmochowski, L. 558
Doll, R. 620
Dragon, V. 647
Dreyer, K. 624
Druckrey, H. 528
Duncan, J. T. K. 652
Dunkel, V. 550
Dunn, L. J. 617

Ebbesen, P. 573
Elashoff, R. M. 454
Elgjo, K. 505
Engebrecht, R. H. 517
Erkman, B. 455
Erokhin, R. A. 485
Ettman, I. K. 653

Faragó, L. 635
Farber, E. 450
Fefer, A. 575
Fernandes Lima, C. B.
  626
Fink, M. A. 552
Fiore-Donati, L. 597
Fortuna, E. 628
Fossati-Guglielmoni, A.
  628
Fraumeni, J. F., Jr. 631
Freeman, A. I. 548
Fujimoto, M. 657

Galikeev, Kh. L. 461
Gandagule, V. N. 634
Gelzer, J. 600
Gennaro, A. R. 613
Georgescu, D. C. 648
Gerber, P. 543
Giacometti, G. 570
Giannattasio, G. 627
Gibley, C. W. 656
Gibson, R. 502
Gillespie, J. H. 562
Gillmann, H. 463
Giraldo, G. 492
Gist, C. 564
Glass, A. G. 631
Glazer, D. E. 551
Glynn, J. P. 575
Goh, K. 664
Goldschmidt, E. 632
Gomez, M. 577
Good, R. A. 580,581
Górski, T. 533
Gottlieb, S. F. 481
Grace, J. T., Jr. 550
Grande de Arruda, B. K.
  626
Gresser, I. 596
Gross, L. 604
Grossbard, L. 525
Grundmann, E. 462
Guasta, G. 547
Guerci, O. 483

Haas, R. 464
Hadley, H. G. 467
Hamilton, T. H. 674
Hammon, W. McD. 545
Hamtoft, H. 624
Hardy, W. R. 544
Harnois, M. 565
Haughton, G. 457
Hay, D. 563
Hecker, E. 444
Henle, W. 464
Henricson, B. 554
Herbeuval, R. 483
Hess, D. M. 569
Higginson, J. 520

Hill, R. H. R. 625
Hinuma, Y. 550
Hinz, R. W. 559
Hirsch, M. S. 576
Ho, M. 565
Hodes, M. E. 588
Hofschneider, P. H. 464
Hollander, C. F. 658
Horodniceanu, E. 647
Horn, K. H. 540
Horoszewicz, J. 550
Howe, C. D. 602
Hughes, L. E. 612
Hughes, N. R. 637
Hurst, L. 516
Hutchison, G. B. 640

Iakovleva, M. P. 636
Iannelli, S. 553
Ibsen, K. H. 645
Ito, Y. 587

Jackson, E. W. 663
Jacob, A. 518,519
Jacobsson, B. 508
Jarrett, O. 563
Jarrett, W. F. H. 563,608
Jayle, M. F. 516
Jensen, M. K. 466,665
Jensen, N. K. 555
Jerne, N. K. 464
Johanson, B. 508
Johnson, K. G. 474
Jones, H. W. 667
Juhász, J. 480
Jung, J. K. 607

Kakuk, T. J. 559
Kalter, S. S. 594
Kelly, D. F. 646
Kendrey, G. 523
Khairallah, L. 446
Khristov, K. 488
Khrustalev, S. A. 644
Kirschstein, R. 566
Kirsten, W. H. 605
Klauber, M. R. 651,663
Klein, G. 539
Kodama, M. 491,589
Kodama, T. 589
Kojima, K. 589
Koldovsky, P. 464
Kolycheva, N. I. 609
Komitowski, D. 534
Konn, M. 550
Koprowski, H. 464
Korobkin, M. 495
Kovács, K. 511
Kramer, S. 481
Krieg, K. 510
Kujumgiev, I. 529
Kurcz, M. 511
Kuretani, K. 657
Kuz'mina, E. G. 659

Lacassagne, A. 516
Laird, H. M. 563
Lamensans, A. 601
Lampe, I. 669
Langham, R. F. 559
Lau, H.-U. 469
Leaver, D. D. 522
Lee, K. M. 562
Leger, L. 473
Lemberg, V. K. 485
Levy, B. M. 571
Liavåg, I. 671
Libánský, J. 598
Lippincott, S. W. 472
Lisa, J. R. 449
Lloyd, B. J. 551
Lopez-Corella, E. 649
Lowell, D. M. 475
Luchnik, N. V. 659
Ludwig, F. C. 454
Luria, S. B. 475

Maaløe, O. 464
MacDonald, E. J. 622
Macedo Macedo, E. 619
Mach, O. 598
MacKay, E. N. 621
Magris, D. 616
Markert, C. L. 460
Martineau, R. G. 475
Martynenko, B. F. 639
Marzot, G. 629,630
Mayer, L. A. 605
McConnell, T. S. 661
McCoy, J. L. 575
McGilvray, E. 525
McIntire, K. R. 573
McKinnell, R. G. 590
Meara, R. H. 486
Melnick, J. L. 595
Merchant, J. A. 617
Mering, L. G. 636
Merkow, L. 567,568
Meunier, M. 518
Miller, O. 525
Mishra, S. K. 536
Mitchell, G. W., Jr. 662
Mitus, A. 484
Mollier, M. F. 601
Moloney, J. B. 578,579
Mor, C. 627
Munk, K. 465
Murray, R. K. 446
Murthy, H. S. R. 536

Nagasawa, H. 657
Nagata, C. 491
Neimann, J. L. 483
Nielsen, M. 632
Nilsson, A. 479
Noronha, F. 562
Norris, F. D. 663
Novotná, O. 598
Nugmanov, S. N. 609

Okano, T. 490
Okuyan, M. 586
Orlova, L. V. 644
Orr, H. C. 579
Osswald, H. 499

Pardo, M. 568
Paris, J. 561
Park, I.-J. 667
Parodi, A. 561
Parsons, L. 661
Pataki, J. 496
Patel, A. S. 532
Pavlovsky, A. 542
Payne, L. N. 580,581
Peacock, P. R. 494
Pennelli, N. 597
Perk, K. 577,578
Peters, E. 566
Petrini, M. T. 553
Petrova, I. P. 644
Piccotti, F. 471
Picone, D. 614
Pineles, S. 647
Pinkel, D. 548,599
Piperkov, T. 633
Pisano, E. 553
Pitot, H. C. 446,458
Ponomarkov, V. I. 644
Pontén, J. 549
Popoff, N. 524
Poriadkova, N. A. 659
Post, J. E. 562
Potter, M. 459
Powell, D. J. 611
Prates, M. D. 623
Ptáčková, B. 643

Ragland, W. 446
Rao, V. N. V. 530
Rapoza, N. P. 567,568
Rask-Nielsen, R. 573
Reddy, D. J. 642
Reddy, J. 521
Reid, B. 468
Reisher, J. I. 579
Ribacchi, R. 492
Rich, M. A. 606
Richard, C. G. 562
Richards, V. 447,538
Ridaura-Sanz, C. 649
Ringertz, N. 554
Ripstein, C. B. 482
Roe, F. J. C. 445
Rosen, D. 525
Rosenblatt, M. B. 449
Rosenblum, E. N. 543
Rosi, F. 493
Rott, R. 464
Rowson, K. E. K. 445
Rutovitz, D. 673

Sabin, A. B. 456

nger, E. L. 477
chorawala, C. J. 497
p, W. J. 541
o, K. 474
age, E. L. 562
poli, G. L. 655
evola, M. E. 570
mähl, D. 442,451
ütte, K. H. 504
warz, K. 448
weiger, H.-G. 464
tt, D. 572
a, E. 630
a, M. 464
in, C. E. 498
llers, A. H. 621
llyei, M. 660
abad, L.-M. 470
achat, D. A. 578
ah, K. V. 569
apiro, S. 640
arma, S. C. 501
eers, G. 507
erlock, P. 526
ullenberger, C. C. 602
egler, R. 606
mmers, M. H. 645
nson, L. R. 669
nkovics, J. G. 571,602
nnhuber, R. O. 517
ifkin, M. 567,568
ith, B. C. 641
ith, J. W. 548
ith, O. 566
ell, G. D. 574
lomon, J. J. 581
mers, K. D. 605
ain, D. M. 482
anedda, R. 655
erber, A. 662
ivastava, S. P. 501
evenson, M. I. 551
ewart, S. E. 551,592,593
ickley, E. E. 472
Stiffel, C. 601
Stone, D. B. 617
Struve, M. E. 500
Stubbs, E. L. 582
Sundelin, P. 479
Sunderman, F. W., Jr. 498
Sutton, C. H. 524
Sutton, P. R. N. 672
Svoboda, D. 520,521
Syruček, L. 464
Szakacs, A. 571

Tagashira, Y. 491
Tanimura, H. 509
Tassi, G. C. 570
Tefft, M. 484
Temin, H. M. 585
Templeton, A. R. 507
Tennant, J. R. 574
Tessmer, C. F. 571,656
Thibaut, G. 483
Thoma, G. E. 477
Thorslund, T. W. 474
Tiboldi, T. 511
Tompkins, E. A. 477
Torres, F. O. 623
Toya, R. E., Sr. 531
Tracey, J. P. 526
Traissac, R. 515
Trentin, J. J. 564
Tridente, G. 597
Turner, J. H. 663
Turner, W. 572,577
Turusov, V. S. 512

Udovich, M. 616
Uekama, K. 490

Valdivia Ampuero, A. 619
Valmikinathan, K. 530
Van Hoosier, G. L. 564
Vasil'eva, I. A. 514
Vawter, G. F. 484
Verghese, N. 530
Vesselinovitch, S. D. 537
Vianello, M. G. 654
Villalobos Perez, J. J. 610
Villa-Treviño, S. 522
Vinter, V. G. 513
Viscomi, N. 629
Vishnoi, R. 634
Vogt, P. K. 464

Wagner, G. 443
Wahal, K. M. 487
Wales, J. H. 517
Wallbank, A. M. 582
Wanebo, C. K. 474
Waterhouse, J. A. H. 611
Wecker, E. 464
Wellington, J. S. 454
Werner, G. H. 583
Williams, E. H. 495
Witzleben, C. L. 668
Wlos, R. 496
Wolf, P. F. 622
Wyers, M. 561

Yamaguchi, J. 550
Yohn, D. S. 545
Yoshida, K. 599
Yoshida, T. O. 587

Zambernard, J. 590
Zelickson, A. S. 546
Zhivetskii, A. V. 638
Zimmerman, H. M. 524
Zini, C. 489
Zizi, P. 553

SUBJECT INDEX

ABNORMALITIES, CONGENITAL
  aniridia, with Wilms' tumor: 631
ACETAMIDE, THIO-
  liver tumors, rat: 520
    ultrastructure, rat: 523
ADRENAL CORTEX
  benzanthracene derivative toxicity, rat: 496
  ^{90}Sr carcinogenesis, rat: 476
AFLATOXIN
  carcinogenesis, mechanism, review: 461
  hepatoma, trout: 517
  isolation, *Streptomyces* from unidentified human lung disease: 536
  liver cancer, Uganda: 495
  plasma binding *in vitro*: 530
  stomach cancer, rodent (*Praomys natalensis*): 645
AFLATOXIN B_1
  effect on liver proteins, rat: 522
  liver tumors, rat: 520
AIR POLLUTION
  benzpyrene, steel mill, Japan: 509
ALCOHOL CONSUMPTION
  esophagus cancer, USSR (Kazakhstan): 609
  stomach cancer, Mexico: 610
ANILINE DERIVATIVES
  dimethylaminoazobenzene type, liver tumors, rat: 497
ANTITUMOR AGENTS
  cyclophosphamide, effect on tumor chromosomes, breast cancer: 655
ASBESTOS
  bodies, primary lung cancer: 494
  occupational exposure, lung diseases including cancer: 507
  toxicity, pleura: 535
AZOBENZENE, 3'-METHYL-4-DIMETHYLAMINO-
  effect on nucleolus, rat liver: 521
  liver tumors, rat: 520
AZOBENZENE, 4-DIMETHYLAMINO-
  and analogs, liver tumors, rat: 497
  liver tumors, carbohydrate metabolism, rat: 519
    effect of estrogens, rat: 516
    glycogen metabolism, rat: 518

BENZANTHRACENE, 1,2,5,6-DI-
  brain tumors, virus-like particles, mouse: 524
BENZANTHRACENE, 7,12-DIMETHYL-
  liver enzyme induction, effect of thalidomide, rat: 527
  premalignant skin or s.c. tumors, mouse: 500
  + radiation, skin tumors, mouse: 512
BENZANTHRACENE DERIVATIVES
  adrenal toxicity, rat: 496
BENZENE
  acute leukemia with pseudo-Pelger anomaly: 489
BENZIMIDAZOLE AND BENZTHIAZOLE DERIVATIVES
  dimethylaminoazobenzene type, liver tumors, rat: 497
3,4-BENZPYRENE
  air, steel mill, Japan: 509
3,4-BENZPYRENE (Contd.)
  brain tumors, virus-like particles, mouse: 524
  reaction with nucleohistones, cell-free system: 491
    vanadium pentoxide: 533
BERYLLIUM
  bone tumors, rabbit: 534
BETEL NUT
  chewing, gingival cancer: 501
BISMUTH SUBCARBONATE
  lung tumors or fibrosarcoma, rat: 499
BLADDER NEOPLASMS
  epidemiology, Portuguese East Africa: 623
BLOOD
  plasma, aflatoxin binding *in vitro*: 530
BLOOD GROUPS
  ABO, breast or cervix cancer: 636
    lung cancer: 636
    stomach cancer: 636
      Mexico: 610
  Gc, distribution, human cancer: 637
BONE MARROW DISEASES
  non-leukemic, chromosome morphology: 665
BONE
  fractures, fixation by intramedullary nails, acute leukemia: 483
BONE NEOPLASMS
  induction, beryllium, rabbit: 534
    ^{239}Pu, rat: 485
  radiation-induced, pathology, mouse: 479
    second primary tumors, child: 484
BRAIN NEOPLASMS
  germ cell origin: 669
  induction
    benzpyrene, virus-like particles, mouse: 524
    dibenzanthracene, virus-like particles, mouse: 524
    methylcholanthrene, mouse: 487
  oligodendroglioma, pathogenesis of malignant transformation: 670
BREAST NEOPLASMS (See Mammary neoplasms, human)
BRONCHUS NEOPLASMS
  epidemiology, Rumania (urban and rural): 647, 648

CAPSICIN (*Capsicum annum* ALKALOID)
  stimulation of plant tumors: 529
CARBON TETRACHLORIDE
  possible liver carcinogenesis, and alcoholic cirrhosis, human: 526
CARCINOGENESIS
  mechanism, review: 444,463
CARCINOGENESIS, CHEMICAL
  interaction with viruses, review: 445
  intra- and extracelular control, review: 462
  mechanism, review: 444,450
  role of immunity, review: 447,538
CARCINOGENS, CHEMICAL
  environmental, review: 442,451,470
  inactivation by vanadium pentoxide: 533
CERVIX UTERI NEOPLASMS
  blood groups (ABO): 636

VIX UTERI NEOPLASMS (Contd.)
  cell mass (nucleus, nucleolus or cytoplasm) during growth and differentiation: 615
  epidemiology
    Canada: 620
    India: 642
    Italy (Ravenna): 630
    India: 634
    Jamaica (Cayman Islands): 650
    methods, review: 443,469
  etiology, review: 468
  hereditary enzyme disorder, tumor enzyme metabolism: 667
  malignant and premalignant, Bulgaria (Moslem and non-Moslem): 633
LATING AGENTS
  effect on radioisotope bone tumors, rat: 485
ORINE
  water supply, toxicity, rat: 528
OMOSOMES
  abnormalities, and cancer, review: 452
  antomatic analysis, apparatus and methods: 673
  clone evolution during chemotherapy, breast cancer: 655
  distribution, tumor cell clone: 659
  DNA synthesis, exptl. tumor: 660
  evolution *in vivo* or *in vitro*, mouse mammary tumor: 654
  familial colon polyposis with/without cancer: 661
  human cancer or leukemia, review: 455,466
  non-leukemic bone marrow diseases: 665
  marker, human cancer: 664
  Ph^1, acute leukemia, LSD addict: 525
  radiation effects, tumor cells *in vitro*: 471
  sex, late-replicating X, polycystic ovarian disease and cancer: 662
  transcription and translation, effect of estrogens: 674
RCUMCISION
  and cervix or penis cancer, India: 642
LON
  polyposis, incidence, comparison to cancer incidence: 616
    with/without cancer, familial, WBC chromosomes: 661
LON NEOPLASMS
  epidemiology, Argentina: 614
  familial (brother, sister, father): 613
    polyposis, WBC chromosomes: 661
  malignant, comparison to benign polyposis incidence: 612
  transverse colon or splenic flexure: 613
NNECTIVE TISSUE NEOPLASMS
  induction, methylcholanthrene, snail: 510
  radiation-induced, second primary, child: 484
  rhabdomyosarcoma, child, attempted virus isolation: 548
RPUS UTERI NEOPLASMS
  endometrial, and diabetes: 617
  epidemiology, Canada: 620
  placenta, choriocarcinoma, transfer to fetus: 668

ABETES MELLITUS
  and cancer: 616

DIABETES MELLITUS (Contd.)
  and endomterial cancer: 617
DIET
  possible aflatoxin contamination, stomach cancer, rodent (*Praomys natalensis*): 645
DIETARY HABITS
  stomach cancer, Mexico: 610
  tea consumption, esophagus cancer, USSR (Kazakhstan): 609
DISEASE TRANSMISSION
  leukemia, dogs and their owners: 644
DRUG ADDICTION
  LSD, mescaline, marihuana and barbiturates, Ph^1-positive acute leukemia: 525

ENVIRONMENTAL FACTORS
  and cancer, review: 467
  chemical carcinogens, review: 442,451,470
ENZYMES
  catalase, liver, virus leukemia and bacterial infections, mouse: 601
  DNA-mobilizing, separation, Shope fibroma virus: 588
  effect of SV40, normal cells: 570
  glucose-6-phosphate dehydrogenase, hereditary disorder with cervix cancer, tumor enzymology: 667
  liver, hydrocortisone or DMBA induction, effect of thalidomide, rat: 527
EPIDEMIOLOGY
  all tumors
    Brazil (Recife Province): 626
    Canada (Ontario): 621
    Denmark: 624
    Italy: 627
      (Ravenna): 629
    Nigeria (Lagos): 652
    Portuguese East Africa: 623
    U.S. and Canada border areas, comparison: 622
  bovine leukosis, Denmark: 555
    Great Britain: 608
    Sweden: 554
  breast cancer, goiter region, USSR (Ukraine): 638
    mass screening method: 640
  bronchopulmonary cancer, Rumania (urban and rural): 647,648
  canine leukosis: 561
    lymphoma, boxers and other breeds: 560
  cervix cancer, Canada: 620
    India: 634,642
    Italy (Ravenna): 630
    Jamaica (Cayman Islands): 650
    methods, review: 469
    and premalignant lesions, Bulgaria (Moslem and non-Moslem): 633
  color/rectum cancer, Argentina: 614
  esophagus cancer, USSR (Kazakhstan): 609
  larynx cancer, smoking, Hungary: 635
  leukemia, children, California: 651
    Denmark: 555
    mongolism, California: 663
    Sweden: 554
  liver cancer, India: 642
    Mexico City: 649

- EPIDEMIOLOGY (Contd.)
  - liver cancer (Contd.)
    - peanut cultivation, Uganda: 495
    - Portuguese East Africa: 623
  - lung cancer, review: 449
  - paratesticular sarcoma, Northern Ireland: 618
  - penis cancer, India: 642
  - skin cancer, Hong Kong and New Zealand: 625
  - small intestine cancer, Great Britain (Birmingham): 611
  - solid tumors, children, southern Italy: 628
  - stomach cancer, Mexico: 610
  - thyroid cancer, spontaneous, dogs: 646
  - urogenital tumors, USSR (Leningrad): 639
  - uterus cancer, Canada: 620
    - Italy (Ravenna): 630
  - vagina cancer, Czechoslovakia (Brno): 643
  - world, review: 443
- ESOPHAGUS NEOPLASMS
  - epidemiology, USSR (Kazakhstan), smoking and use of tea and alcohol: 609
  - induction, nicotine, sheep: 504
- ESTROGENS
  - breast cancer promotion, human: 515
  - effect on
    - dimethylaminoazobenzene liver carcinogenesis, rat: 516
    - genetic transcription and translation: 674
- ESTRONE ACETATE
  - pituitary tumors, blood supply, rat: 511
- ETHIONINE
  - liver tumors, rat: 520
- EYE
  - abnormalities, with Wilms' tumor: 631
- EYE NEOPLASMS
  - retinoblastoma, sporadic, genetic risk: 632

- FIBROSARCOMA
  - induction, bismuth subcarbonate rat: 499
- FLUORENE, 2-ACETYLAMINO-
  - liver tumors, rat: 514
  - mammary tumors, rat: 514
  - salivary tumors, rat: 514
  - thyroid tumors, effect of methylthiouracil, rat: 488
- FLUOROCARBONS
  - lung tumors, rat: 492

- GASTROINTESTINAL CARCINOGENESIS
  - radiation, human: 473
- GENETICS, ANIMAL
  - histocompatibility, virus leukemogenesis, mouse: 574
  - stomach cancer, rodent (*Praomys natalensis*): 645
- GENETICS, HUMAN
  - and cancer, review: 467
  - familial bilateral breast cancer, mother and daughter: 641
    - colon cancer (brother, sister, father): 613
      - polyposis with/without cancer, chromosome morphology: 661
- GENETICS, HUMAN (Contd.)
  - hereditary enzyme disorder with cervix cancer, tumor enzymology: 667
  - mongolism with leukemia, California: 663
  - retinoblastoma, children of retinoblastoma survivors: 632
  - Wilms' tumor with aniridia: 631
- GENITAL NEOPLASMS, FEMALE
  - and diabetes: 616
  - X chromosome morphology: 662

- HALLUCINOGENS
  - LSD, mescaline and marihuana, Ph^1-positive acute leukemia: 525
- HYDRAZINE SULFATE
  - lung tumors, rat: 492
    - ultrastructure, virus particles, mouse: 493
- HYDROCORTISONE
  - liver enzyme induction, effect of thalidomide, rat: 527
- HYPOTHALAMUS
  - mediation of tumor growth, rat: 666

- IMMUNITY
  - antilymphocyte serum, mechanism of action, virus leukemia: 576
  - chemical or virus carcinogenesis, review: 538
  - exptl. tumors, review: 447,457
  - histocompatibility, virus leukemogenesis, mouse: 574
  - human cancer, review: 457
  - immunoglobulin production *in vitro*, Hodgkin's disease or normal human lymph nodes: 549
  - serum virus reactivity, human cancer: 547
  - SV40 and other adenovirus, primates and man: 594
  - tumor-specific transplanation antigens, review: 539
  - virus-induced leukemia, mouse: 575,597,600
    - lymphoma, chick: 581
- IMMUNITY DISORDERS
  - with myeloma, mouse or human: 557
- INTERFERON
  - effect on Friend leukemia virus, mouse: 596
- INTESTINE, SMALL, NEOPLASMS
  - epidemiology and classification, Great Britain (Birmingham): 611
- ISONIAZID
  - lung and kidney tumors, rat: 492

- KIDNEY CARCINOGENESIS
  - isoniazid, rat: 492
- KIDNEY NEOPLASMS
  - spontaneous, virus isolation, frog: 590
  - Wilms' tumor, with congenital aniridia, child: 631
    - ultrastructure and histogenesis, child: 656

- LARYNX NEOPLASMS
  - epidemiology, smoking, Hungary: 635

IOCARPINE
  effect on nucleolus, rat liver: 521
KEMIA, EXPERIMENTAL (See also Virus, leukemia/lymphoma)
  canine, possible transmission to owner: 644
  feline, virus isolation: 562,563
  human leukemia virus, mouse: 556
  virus-induced, enhancement by arbovirus, mouse: 572
    immunology, mouse: 575
KEMIA, HUMAN
  acute myeloid, Ph^1-positive, drug addict (LSD, mescaline, marihuana and barbiturates): 525
  benzene-induced, pseudo-Pelger anomaly: 489
  bone marrow RNA, effect on normal cells: 553
  chromosome morphology, review: 455,466
  and diabetes: 616
  eosinophilic, differential diagnosis: 544
  epidemiology
    children, California: 651
    Denmark: 555
    mongolism, California: 663
    Sweden: 554
  and fracture fixation by intramedullary nails: 483
  marker chromosomes: 664
  possible transmission from pets: 644
  ultrastructure: 591
  virus isolation, attempted: 548,552
    transmission to mouse: 556
KEMOGENESIS, EXPERIMENTAL (See also under Virus, leukemia/lymphoma)
  methyl methanesulfonate, mouse: 531
  tumor cell DNA ± RNA, mouse: 532
  radiation, mechanism, mouse, review: 454
  urethan, strain differences, mouse: 537
KEMOGENESIS, HUMAN
  ^{131}I, thyrotoxicosis: 477,478
KOSIS (LEUKEMIA), BOVINE
  epidemiology, Denmark: 555
    Great Britain: 608
    Sweden: 554
ER
  catalase, virus leukemia and bacterial infections, mouse: 601
  enzyme induction, DMBA or hydrocortisone, effect of thalidomide, rate: 527
  glycogen and other carbohydrates, dimethylazobenzene hepatoma, rat: 518,519
  nucleolus, effect of carcinogens, rat: 521
  proteins, effect of carcinogens, rat: 522
  ultrastructure, effect of carcinogens, rat: 520
ER CARCINOGENESIS
  acetylaminofluorene, rat: 514
  aflatoxin-contaminated cottonseed or peanut products, trout: 517
  carbon tetrachloride + alcoholic cirrhosis, human: 526
  chemical, tumor ultrastructure, rat: 520
  dimethylaminoazobenzene and analogs, rat: 497
    carbohydrate metabolism, rat: 518,519
    effect of estrogens, rat: 516
  mechanism, review: 446
  thioacetamide, ultrastructure, rat: 523

LIVER DISEASES
  cirrhosis, alcoholic, with CCl$_4$ posoning, possible liver carcinogenesis: 526
    liver cancer, Mexico City: 649
LIVER NEOPLASMS
  epidemiology
    and cirrhosis, Mexico City: 649
    India: 642
    and peanut cultivation, Uganda: 495
    Portuguese East Africa: 623
  intact or hepatectomized mouse: 658
LUNG
  distribution, nickel carbonyl, rat: 498
LUNG CARCINOGENESIS
  bismuth subcarbonate, rat: 499
  fluorocarbons, rat: 492
  hydrazine sulfate, rat: 492
    ultrastructure, virus particles, mouse: 493
  isoniazid, rat: 492
LUNG DISEASES
  bullous emphysema, with lung cancer: 653
  non-malignant, occupational asbestos exposure: 507
  scars, and lung cancer: 482
  Streptomyces infection with aflatoxin contamination, human: 536
  tuberculosis, lung cancer, asbestos bodies: 494
LUNG NEOPLASMS
  asbestos bodies, human: 494
  blood groups (ABO): 636
  bronchogenic carcinoma, with bullous emphysema: 653
  environmental carcinogens, review: 470
  epidemiology
    review: 443,449
    Rumania (urban and rural): 647,648
  and lung scars: 482
  smoking
    asbestos bodies, human: 494
    filtered or unfiltered cigarettes: 502
    London: 503
    Portuguese East Africa: 623
  tuberculosis history, asbestos bodies, human: 494
LYMPHOMA, MALIGNANT, EXPERIMENTAL
  Burkitt type, leukemia virus-induced, mouse: 571
  canine, epidemiology, boxers and other dogs: 560,561
    transmission: 559
LYMPHOMA, MALIGNANT, HUMAN
  Hodgkin's disease, immunoglobulin production in vitro: 549
    virus isolation: 593
  marker chromosomes: 664
  virus isolation and transmission (mouse): 542

MALIGNANT TRANSFORMATION
  mechanism, review: 458,460
MAMMARY CARCINOGENESIS (EXPERIMENTAL)
  acetylaminofluorene, rat: 514
  radiation, effect of oxygen, rat: 481
MAMMARY NEOPLASMS (EXPERIMENTAL)
  chromosome morphology, mouse: 654

MAMMARY NEOPLASMS (EXPERIMENTAL) (Contd.)
  premalignant, detection, mouse: 500
  spontaneous, and reproductive history, mouse: 657
MAMMARY NEOPLASMS (HUMAN)
  bilateral, mother and daughter: 641
  blood groups (ABO): 636
  chromosome stemline, and chemotherapy: 655
  epidemiology
    goiter region, USSR (Ukraine): 638
    mass screening method: 640
    review: 443
  estrogen stimulation: 515
  male, radiation-induced: 475
  and parity, Peru (Arequipa): 619
  radiation exposure, Hiroshima/Nagasaki: 474
MENTAL DISORDERS
  stress, and lip or tongue cancer: 672
METHANESULFONATE, METHYL-
  leukemia, mouse: 531
3-METHYLCHOLANTHRENE
  brain tumors, mouse: 487
  epithelial tumors, snail: 510
  reaction with nucleohistones, cell-free system: 491
  skin tumors, mouse: 533
MOUTH NEOPLASMS
  immunology (serum reaction with viral RNA): 547
  lip or tongue, and mental disorders: 672
  gingiva, betel chewing and tobacco use: 501
  smoking: 506
    Portuguese East Africa: 623
MYELOMA, MULTIPLE
  or plasmacytosis with dysproteinemia, immunology and attempted virus isolation: 557

NEOPLASMS (general & unspecified)
  growth rate calculations, review: 453
NEOPLASMS, EXPERIMENTAL
  Dalton mouse lymphoma, leukemogenesis by DNA and RNA: 532
  Ehrlich carcinoma (mouse), chromosome morphology after *in vitro* irradiation: 471
    stimulation by RNA: 513
  HEP#2 cells, chromose morphology: 659
  immunology, review: 447,457,539
  JBK sarcoma (mouse), chromosomal DNA synthesis: 660
  mediation by hypothalamus, rat: 666
  Moloney sarcoma (mouse), effect of leukemia viruses: 577
  plasma cell tumors, pathogenesis, mouse, review: 459
  rat hepatoma, pathogenesis: 458
  Sarcoma 180 (mouse), chromosome morphology after *in vitro* irradiation: 471
  Seidel hepatoma (rat), effect of ^{90}Sr: 476
  spontaneous, hamster: 540
  venereal, dog, cell line: 541
NEOPLASMS, HUMAN
  blood groups (Gc): 637
  cell lines, effect of nonhuman viruses: 545
  chromosome morphology, review: 452,455
NEOPLASMS, HUMAN (Contd.)
  and diabetes: 616
  environmental carcinogens, review: 442,451, 470
  epidemiology
    Brazil (Recife Province): 626
    Canada (Ontario): 621
    Denmark: 624
    Italy: 627,629
      (Ravenna): 629
      (southern), children: 628
    Nigeria (Lagos): 652
    U.S. and Canada border areas, comparison: 622
  heredity and environment, review: 467
  immunology, review: 457
  risk period, review: 448
NICKEL CARBONYL (Ni(CO)$_4$)
  distribution, rat: 498
NICOTINE (See also under Tobacco)
  anthelmintic containing, esophagus tumors, sheep: 504
4-NITROQUINOLINE-1-OXIDE
  free radical production, effect of DNA, aqueous soln.: 490
NITROSAMINE, DIETHYL-
  liver tumors, rat: 520
NITROSAMINE, DIMETHYL-
  effect on nucleolus, rat liver: 521
NUCLEIC ACIDS, DNA
  and carcinogenesis, review: 444
  chromosomal synthesis, tumor cells: 660
  effect of radiation, adenovirus-12, normal cells: 565
  effect on free radical production by carcinogens, aqueous soln.: 490
  leukemogenesis, mouse: 532
  nucleohistones, reaction with hydrocarbons, cell-free system: 491
NUCLEIC ACIDS, RNA
  and carcinogenesis, review: 444
  leukemic human bone marrow, effect on normal cells: 553
  leukemogenesis, mouse: 532
  nucleolar, effect of carcinogens, rat liver: 521
  tumor stimulation, mouse: 513

OCCUPATIONAL DISEASES
  asbestos exposure, lung diseases including cancer: 507,536
  mineral oil exposure scrotal cancer, (lathe operators): 508
OIL, MINERAL
  myeloma, virus isolation, mouse: 557
  occupational exposure, scrotal cancer: 508
OVARY
  polycystic, X chromosome morphology: 662
OXYGEN
  high pressure, effect on radiation mammary carcinogenesis, rat: 481
OXYGEN DEFICIENCY
  and stomach cancer from peptic ulcer: 480

ANUTS
- cultivation, and hepatoma, Uganda: 495

LGER-HUET ANOMALY
- benzene-induced acute leukemia: 489

NIS NEOPLASMS
- epidemiology, India: 642

TUITARY NEOPLASMS
- estrone-induced, blood supply, rat: 511

ANT NEOPLASMS
- *Agrobacterium tumefaciens*-induced, stimulation by alkaloid: 529

EURA
- asbestos toxicity, occupational: 507,535

EURAL NEOPLASMS
- mesothelioma, occupational asbestos exposure: 507

EGNANCY
- parity, and breast cancer, Peru (Arequipa): 619
  - spontaneous mammary tumors, mouse: 657
- transfer of choriocarcinoma to fetus: 668

OSTATE NEOPLASMS
- pathogenesis: 671

RENE
- reaction with nucleohistones, cell-free system: 491

INOLINE, 4-HYDROXYAMINO-, 1-OXIDE
- free radical production, effect of DNA, aqueous soln.: 490

DIATION
- effect on
  - adenovirus-12 DNA, normal cells: 565
  - tumor cell chromosomes *in vitro*: 471

DIATION CARCINOGENESIS
- interaction with viruses, review: 445

DIATION CARCINOGENESIS, EXPERIMENTAL
- bone, mouse: 479
  - and soft tissue, effect of chelating agent, rat: 485
- + dimethylbenzanthracene, skin, mouse: 512
- mammary, effect of oxygen, rat: 481
- skin, mouse: 472
- ^{90}Sr, adrenocortical pathology, rat: 476

ADIATION CARCINOGENESIS, HUMAN
- atomic exposure, breast cancer, Hiroshima/Nagasaki: 474
- child: 484
- male breast: 475
- mouth, and smoking: 506
- skin: 486
- stomach: 473

ADIATION LEUKEMOGENESIS, EXPERIMENTAL
- mechanism, mouse, review: 454

ADIATION LEUKEMOGENESIS, HUMAN
- child: 484
- ^{131}I, thyrotoxicosis: 477,478

ADIOISOTOPES
- ^{131}I, leukemogenesis, human (thyrotoxicosis): 477,478
- ^{239}Pu, bone and soft tissue tumors, rat: 485
- ^{90}Sr, bone tumors, mouse: 479
  - effect on adrenal cortex and transplanted tumor, rat: 476

RECTUM NEOPLASMS
- benign (polyps) and/or malignant (carcinoma), incidence: 612
- epidemiology, Argentina: 614

RETRORSINE
- effect on liver proteins, rat: 522

SALIVARY GLAND NEOPLASMS
- induction, acetylaminofluorene, rat: 514

SARCOMA
- human, virus isolation: 592

SCAR TISSUE
- lung, and lung cancer: 482
- vaccination, skin cancer: 546

SKIN
- effect of tobacco smoke, mouse: 505

SKIN CARCINOGENESIS, EXPERIMENTAL
- dimethylbenzanthracene, premalignant, mouse: 500
  - + radiation, mouse: 512
- methylcholanthrene, mouse: 533
- radiation, mouse: 472

SKIN CARCINOGENESIS, HUMAN
- mineral oil, occupational exposure, scrotum: 508
- spinal radiotherapy: 486

SKIN NEOPLASMS, HUMAN
- benign or malignent, epidemiology, Hong Kong and New Zealand: 625
- and diabetes: 616
- epidemiology, review: 443
- melanoma, marker chromosomes: 664
- vaccination scar: 546

STOMACH NEOPLASMS, EXPERIMENTAL
- dietary and/or genetic factors, rodent (*Praomys natalensis*): 645

STOMACH NEOPLASMS, HUMAN
- blood groups (ABO): 636
- epidemiology, Mexico: 610
  - review: 443
- induction, radiotherapy of embryonal tumors: 473
- peptic ulcer, histogenesis, role of hypoxia: 480

TANNIC ACID
- effect on nucleolus, rat liver: 521

TESTIS NEOPLASMS
- radiotherapy, stomach cancer induction: 473
- paratesticular sarcoma, epidemiology, Northern Ireland: 618

TETRACENE
- reaction with nucleohistones, cell-free system: 491

THALIDOMIDE
- effect on DMBA or hydrocortisone liver enzyme induction, rat: 527

THIOURACIL, METHYL-
- effect on acetylaminofluorene carcinogenesis, rat thyroid: 488

THYROID DISEASES
- goiter, breast cancer, USSR (Ukraine): 638
- thyrotoxicosis, ^{131}I leukemogenesis, human: 477,478

THYROID NEOPLASMS
  epidemiology, dogs: 646
  induction, acetylaminofluorene + methylthiouracil, rat: 488
TOBACCO (See also under Nicotine)
  chewing, gingival cancer: 501
TOBACCO SMOKE
  effect on mitosis, mouse skin: 505
  filtration, lung cancer: 502
TOBACCO SMOKING
  bronchial cancer, Rumania: 647
  esophagus cancer, USSR (Kazakhstan): 609
  gingival cancer: 501
  larynx cancer: 635
  lung cancer, asbestos bodies: 494
    effect of cigarette filters: 502
    London: 503
    Portuguese East Africa: 623
  lung scar cancer: 482
  mouth cancer, Portuguese East Africa: 623
  oropharyngeal cancer: 506
  stomach cancer, Mexico: 610

ULCER, PEPTIC
  and stomach cancer, histogenesis, role of hypoxia: 480
URETHAN
  leukemogenesis, strain differences, mouse: 537
UROGENITAL NEOPLASMS
  epidemiology, USSR (Leningrad): 639

VAGINA NEOPLASMS
  epidemiology, Czechoslovakia (Brno): 643
VANADIUM PENTOXIDE
  reaction with carcinogens: 533
VIRAL CARCINOGENESIS
  human, review: 456
  immunology, review: 447,538
  interaction with chemical carcinogens, review: 445
  mechanism: 595
    review: 450,465
VIRUS
  bovine or equine, effect on human tumor cells: 545
  foot-and-mouth disease, serum reactivity as index of disease progression, human cancer: 547
  Guaroa (Bunyamwere type arbovirus), effect on leukemia virus infection, mouse: 572
  herpes, antibody titers, monkeys and man: 543
  isolation, mouse or human myeloma: 557
    spontaneous kidney tumor, frog: 590
  particles resembling, benzpyrene- or dibenzanthracene-induced brain tumors, mouse: 524
    hydrazine-induced lung tumors, mouse: 493
  polyoma, morphology, latent infection, L cells: 589
  Shope fibroma, separation of DNA-mobilizing enzymes: 588
  Shope papilloma, antigen synthesis *in vitro*: 587
  vaccinia, skin cancer on vaccination scar: 546

VIRUS, ADENO
  antibody formation, primates and man: 594
  SV30, tumor cell lines, hamster: 567
    morphology: 568
  SV40, effect on enzymes, normal cells: 570
    infection, immunology, monkey: 569
  tumor induction, effect of thymectomy, hamster: 564
  type 12, effect of adeno-associated virus, animal: 566
    radiation, normal cells: 565
VIRUS, LEUKEMIA/LYMPHOMA
  Balb/Tennant (mouse), host genetics (histocompatibility): 574
  bovine leukosis, epidemiology, Britain: 608
  Burkitt lymphoma (herpes-type)
    cultivation and properties: 550,551
    infection, kittens: 550
  canine lymphoma, boxers: 560
    transmission: 559
  feline, isolation and transmission: 562,563
  Friend (mouse)
    effect of arbovirus: 572
      interferon: 596
    effect on Moloney virus sarcoma: 577
    immunology: 575
  human
    attempted isolation: 548,558
    immunology: 552
    isolation, Hodgkin's disease cultures: 593
      mouse transmission: 542,556
  mouse
    attenuation, method: 602
    classification and pathology, 604,606
    effect of antilymphocyte serum: 576
    erythroblastosis, tumor pathology: 605
    immunity: 597
    isolation and properties: 558,573,598
    liver catalase: 601
  Moloney (mouse)
    effect on Moloney virus sarcoma: 577
    immunoassay *in vitro*, method: 599
    immunology *in vivo*: 575
    virus proliferation and recovery: 579
  Rauscher (mouse)
    effect of arbovirus: 572
    effect on Moloney virus sarcoma: 577
    immunity *in vivo*: 575,600
    immunoassay *in vitro*, method: 599
    in vitro activity: 607
    lymphoma pathology: 571
    ultrastructure: 603
  RPL-12 avian leukosis, immunology, chick: 581
    tumor pathology and effect of bursa of Fabricius, chick: 580
VIRUS, MAMMARY TUMOR
  review: 464
VIRUS, SARCOMA
  avian, mechanism of action: 585
    strain 13, properties and classification: 582
  human
    attempted isolation, childhood rhabdomyosarcoma: 548
    isolation and properties: 558

RUS, SARCOMA (Contd.)
- human (Contd.)
  - myxovirus type, isolation: 592
- Moloney (mouse)
  - effect of leukemia viruses: 577
  - pathology of rat tumor: 578
- mouse
  - erythroblastosis, tumor pathology: 605
  - isolation and properties: 558

VIRUS, SARCOMA (Contd.)
- Rous
  - comparison to quail tumor virus: 583
  - pathology, brain, chick: 584
  - strain differences: 586

WATER
- chlorine content, toxicity, rat: 528

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

616.99405
CAR

Vet. Med.

APRIL 1969
Abstract Nos. 675-898

Vol. 7
No. 4

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

CARCINOGENESIS ABSTRACTS

Volume 7, Number 4
April, 1969

(Submitted for Publication
January, 1969)

Abstract Numbers
675-898

CONTENTS

	Page
Review	144
Physical Carcinogenesis	146
Chemical Carcinogenesis	148
Viral Carcinogenesis	165
Epidemiology and Biometry	180
Miscellaneous	185
Author Index	i
Subject Index	iv
Erratum	x

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a national program of cooperative research in cancer, is establishing a means whereby information in the field of carcinogenesis will be coordinated and made available. The information to be included will be obtained from the National Cancer Institute, other governmental agencies, and non-governmental research institutions.

The issuing of Carcinogenesis Abstracts under the auspices of the National Cancer Institute will provide a central source for current abstraction of the carcinogenesis literature being published throughout the world. This will help facilitate an integrated and cooperative program of investigation in this area. The growing number of publications in the area of carcinogenesis makes imperative the availability of an appropriate abstraction service so that investigators may be apprised of progress with a minimum of delay. It is our desire to provide the investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most recently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviation used by Index Medicus. If the journal is not covered by Index Medicus, then the abbreviations (with some modifications) found in World Medical Periodicals, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

admin.	administered, administration	mg	milligram(s)
av.	average	min.	minute(s)
C	curie(s)	ml	milliliter(s)
mC	millicurie(s)	mm	millimeter(s)
µC	microcurie(s)	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
conc.	concentration	NIH	National Institutes of Health, USA
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	QO_2	oxygen quotient
DNase	deoxyribonuclease	PFU	plaque forming unit
e.g.	for example	ppm	parts per million
FFU	focus forming unit	pt.(s)	patient(s)
g.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
g	gram(s)	RES	reticuloendothelial system
µg	microgram(s)	resp.	respectively
Hb	hemoglobin	RNA	ribonucleic acid
i.a.	intra-arterial	RNase	ribonuclease
ID_{50}	median infectious dose	soln.	solution
inj	injected, injection(s)	s.c.	subcutaneous
inoc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
i.p.	intraperitoneal	x	times (e.g. x 3/wk.)
I.U.	international unit(s)	U	unit
i.v.	intravenous	UV	ultraviolet
kg	kilogram(s)	vol.	volume
LD_{50}	median lethal dose	VA	Veterans Administration
M	molar, mole(s)	wt.	weight
mM	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
µM	micromole(s)		
Max.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

Af.	Afrikaans	E.	English	Hun.	Hungarian	Lith.	Lithuanian	Ser.	Serbo-Croatian
Ar.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
Bul.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
Ch.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
Cz.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
Dan.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
Dut.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

CARCINOGENESIS ABSTRACTS

Volume 7, Number 4

April, 1969

69-675 EXPERIMENTAL TOBACCO CARCINOGENESIS. (E.) Wynder, E. L. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.) and D. Hoffmann. Science 162(3856):862-871, 1968. (63 references)

Studies of tumor induction and promotion in animals (rats, mice, rabbits, hamsters, dogs) by tobacco smoke and its condensates are discussed. It is concluded that reduction of the conc. of agents with specific toxic and carcinogenic effects in animals may be associated with a reduction in the human risk of lung cancer and other diseases associated with smoking, but extrapolation from experimental data to clinical data is difficult.

69-676 CANCER, AN UNSTABLE REGULATORY CYCLE: STUDY BY SYSTEM ANALYSIS. (Ger.) Düchting, W. (7 Blücher St., Gummersbach, Germany). Kybernetik 5(2):70-77, 1968. (18 references)

Mathematical models are derived for describing the growth rates of normal cells and of benign and malignant tumors and their control mechanisms. The data indicate instability of the automatic control mechanism responsible for cell proliferation in malignant diseases, which could be overcome by a drug which affects the molecular structure of the regulatory genes.

69-677 BREAST CANCER. (Ger.) Maass, H. (U. Women's Clin., Hamburg-Eppendorf, Germany). Geburtsh. Frauenheilk. 28(9):823-848, 1968. (63 references)

Hormonal factors of significance in the incidence and prognosis of breast cancer are discussed.

69-678 LEUKEMIA IN HUMANS AND ANIMALS IN THE LIGHT OF EPIDEMIOLOGIC STUDIES, WITH REFERENCE TO PROBLEMS OF ITS PREVENTION. (E.) Aleksandrowicz, J. (Med. Acad., Cracow, Poland). Acta Med. Pol. 9(2):217-230, 1968. (83 references)

A discussion of possible genetic factors in man predisposing to susceptibility to leukemogenic viruses or chemicals is supplemented by reports of a high frequency of occupational exposure to cattle and bovine products in the author's pts. with malignant diseases, particularly leukemia.

69-679 USE OF NEWBORN AND INFANT ANIMALS IN CARCINOGENICITY TESTING. (E.) Della Porta, G. (Nat. Inst. Study Cure Tumors, Milan, Italy). Food Cosmet. Toxic. 6(2):243-252, 1968. (46 references)

Of the newborn and infant animals used in carcinogencity testing, mice are the primary experimental animals. Tumor production incidence is higher and more rapid in very young animals; best results are seen in animals admin. a carcinogen at 5-10 days of age, especially after repeated carcinogen admin. (rather than treatment with a single high dose).

69-680 FOOD ADDITIVES AND CHEMICAL CARCINOGENS: ON THE CONCEPT OF ZERO TOLERANCE. (E.) Weisburger, J. H. (NCI, Bethesda, Md.) and E. K. Weisburger. Food Cosmet. Toxic. 6(2): 235-242, 1968. (24 references)

The carcinogenic effects of food additives are discussed with reference to recent dose-response studies in animals. The existence of chemical and other factors potentiating the effects of some carcinogens led to the conclusion that a "no-effect" dose of a carcinogen is a relative term, applying only to certain precise experimental conditions, and that deliberate addition to the existing environmental carcinogen burden should be avoided.

69-681 THEORY OF TUMOUR INITIATION BY CHEMICAL CARCINOGENS: DEPENDENCE OF ACTIVITY ON STRUCTURE OF ULTIMATE CARCINOGEN. (E.) Dipple, A. (Roy. Cancer Hosp., London), P. D. Lawley and P. Brookes. Europ. J. Cancer 4(5): 493-506, 1968.

Structure-activity relationships of the ultimate carcinogens derived from compounds of the aromatic hydrocarbon, aromatic amine and azo dye series are discussed. The data are consistent with a mutational hypothesis (interaction of the ultimate carcinogen with DNA).

69-682 THE RISK OF THYROID CANCERS FOLLOWING IRRADIATION. (E.) Dolphin, G. W. (U. K. Atomic Energy Auth., Harwell, Didcot, Berks, England). Health Phys. 15(3):219-228, 1968. (34 references)

The risk of thyroid cancer following irradiation for thymic enlargement in adult life seems to be lower than that following irradiation in infancy (approx. 30-40 and $100/10^6$/rad, resp.). The risk may be reduced at increasing radiation doses (about 2000 rads). Data from several small groups of adults (most over 40) treated with ^{131}I (about 10,000 rads) for thyrotoxicosis suggest an unexpectedly low thyroid cancer risk.

69-683 THE J. BURNS AMBERSON LECTURE. THE CAUSES OF LUNG CANCER. (E.) Kuschner, M. (New York U. Sch. Med., N. Y.). Amer. Rev. Resp. Dis. 98(4):573-590, 1968. (27 references)

Experimental work (rats and mice) by the author and his colleagues on chemical and radiation lung carcinogenesis is reviewed. The possible effects of injuries and virus diseases (particularly influenza) as cofactors in lung carcinogenesis are also discussed.

69-684 THE BIOLOGY OF VIRAL CARCINOGENESIS. (E.) Habel, K. (NIH, Bethesda, Md.). Cancer Res. 28(9):1825-1831, 1968. (54 references)

The susceptibility of particular cells to virus-induced transformation may be modified by a number of structural, physiological and karyologic characteristics. If continued replication of cellular DNA is required for the integration of viral DNA based on homologous areas, the low efficiency of transformation suggests that a precise timing of multifactored events must also be involved. Early stimulation of cellular DNA synthesis by induction of increased DNA-synthetic enzymatic activity may increase the opportunity for integration, following which virus maturation is suppressed but depression of cellular DNA synthesis continues, possibly due in large part to the role of early viral coded proteins demonstrated as new antigens. At the same time, however, the presence of new, foreign antigens at the cell surface frequently results in their immunologic rejection, suggesting a possible, spontaneous limitation of the ability of some virus-transformed cells to develop into active tumors.

69-685 THE ROLE OF THE VIRAL GENOME IN ONCOGENESIS. (E.) Rapp, F. (Baylor U. Coll. Med., Houston, Tex.). Cancer Res. 28(9): 1832-1834, 1968. (24 references)

A review of studies of specific virus-induced antigens in SV40-transformed hamster cells, complemented by a discussion of the oncogenicity of adenoviruses carrying defective SV40 genetic information.

69-686 MALIGNANT TRANSFORMATION IN VITRO BY ONCOGENIC VIRUSES. (E.) Black, P. H. (Harvard Med. Sch., Boston, Mass.). JAMA 206(6):1258-1262, 1968. (14 references)

On the basis of experimental data on virus transformation (particularly with SV40), it is suggested that human tumor cells should be examined for the presence of virus-specific, transplantation and T antigens (all present in virus-transformed cells) and for virus-specific messenger RNA, with particular reference to the adenoviruses.

69-687 INTERACTIONS OF RNA ONCOGENIC VIRUSES AND CELLS. (E.) Vigier, P. (Fac. Sci., Orsay, France). Bibl. Haemat. 30:11-25, 1968. (99 references)

The mechanisms of replication and cell transformation of the RNA-containing tumor viruses (mouse mammary tumor virus, mouse sarcoma and leukemia viruses) are discussed.

69-688 EMBRYONIC CONSTITUENTS IN TUMORS AND ANTIBODIES IN CANCEROUS PATIENTS. (E.) Grabar, P. (Nat. Sci. Res. Ctr., Villejuif, France). Pp. 86-99 in Current Topics in Microbiology and Immunology, Vol. 44, Arber, W., et al. (Eds.). Publ.: Springer-Verlag, New York, 1968, 175 pp. (28 references).

69-689 CANCER AND HEREDITY. (Jap.) Gan no Rinsho (Jap. J. Cancer Clin.) 14(8): 625-630, 1968. (28 references)

69-690 The Health Consequences of Smoking, U. S. Government Printing Office, Washington, D. C., 1968, 117 pp. (221 references)

69-691 INTERACTIONS BETWEEN CELLS AND ONCOGENIC VIRUSES. DETERMINANTS OF VIRAL CARCINOGENESIS. (E.) Melnick, J. L. (Baylor U. Coll. Med., Houston, Tex.). Bibl. Haemat. 30:1-10, 1968. (13 references)

69-692 ADVANCES IN RESEARCH ON LEUKEMOGENIC VIRUSES. RECENT STUDIES ON THE ETIOLOGY OF MOUSE LEUKEMIA AND LYMPHOMAS. (E.) Gross, L. (Vet. Admin. Hosp., Bronx, N. Y.). Bibl. Haemat. 30:48-53, 1968. (15 references)

69-693 PATHOLOGY OF VIRUS LEUKEMIA IN THE MOUSE. (E.) Siegler, R. (Einstein Med. Ctr., Philadelphia, Pa.) and M. A. Rich. Bibl. Haemat. 30:66-69, 1968. (14 references)

69-694 INCIDENCE OF LYMPHATIC LEUKEMIA AND METHYLCHOLANTHRENE-INDUCED CANCER IN LABORATORY MICE SUBJECTED TO STRESS. (E.) Kaliss, N. (Jackson Lab., Bar Harbor, Me.) and J. L. Fuller. J. Nat. Cancer Inst. 41(4):967-983, 1968.

The leukemia incidence was studied in AKR/J mice (both sexes) stressed by repeated electroshock (or equivalent handling) or crowding and in (AKR/J x DBA/2)F_1 mice undergoing repeated audiogenic seizures. Carcinogenesis by 1 inj. of 3-methylcholanthrene (0.25 mg s.c. in trioctanoin) was studied in C57BL/6J mice treated by electroshock and in (C57BL/6J x DBA/2)F_1 mice treated by audiogenic seizures. The stressors did not significantly affect the tumor incidence, although changes in body wt. gain, rectal temperature and activity were noted.

69-695 EXPERIMENTAL MYELOPROLIFERATIVE AND LYMPHOPROLIFERATIVE DISEASES OF SWINE. (E.) Howard, E. B. (Pacific Northwest Lab., Richland, Wash.), W. J. Clarke and P. L. Hackett. Bibl. Haemat. 30:255-262, 1968.

Treatment with ^{90}Sr (1-3100 μC/day p.o.) caused time and dose-dependent proliferative or leukemoid changes in the hematopoietic and lymphoreticular system of 50/665 (7.5%) female miniature swine and their offspring (32 myeloproliferative, 18 lymphoreticular), even at low doses (1, 5 and 25 μC/day, total 300 rads or less). These tissues were apparently more sensitive to this form of ionizing radiation than the bone, since bone tumors were found incidentally to the leukemic state in only a few animals. The myelofibrosis-myeloid leukemia syndrome resembled the human syndrome in many respects (including generalized infiltration of most visceral organs with myeloblastic elements and proliferation of myeloblasts in some bone marrow areas). In animals with lymphatic disorders, malignant lymphoid elements were found in most areas of the RES and 2 variants resembling reticulum cell sarcoma and Hodgkin's disease were noted. Bone marrow chromosome spread from these animals showed changes in the myeloid cells ("sticky" chromosomes and deletions or gaps in chromosomes). Electron microscopy of spleen cells and high-speed plasma pellets from animals with myeloid leukemia revealed subcellular particles resembling viruses usually associated with leukemia. Similar particles were observed on electron microscopy of cultured kidney cells from newborn pigs previously inoc. with a filtrate of leukemic tissue and plasma, but cellular and cell-free preparations from leukemic tissue did not induce leukemia in mice, hamsters or non-irradiated newborn swine.

69-696 RADIATION INDUCED ASYMMETRY AND LYMPHOMA OF THYMUS IN MICE. (E.) Järplid, B. (Res. Inst. Nat. Def., Sundbyberg, Sweden). Acta Radiol. (Stockholm) Suppl. 279:7-98, 1968.

The long- and short-term effects of radiation (550 r) in a single dose (SD) or fractionated doses (FD) were studied in inbred C3H mice (age 25 or 75 days in most experiments). Thymic atrophy and regeneration were seen in both groups; asymmetrical regeneration was seen only after FD (30% of mice in the early stages of regeneration; some additional mice developed thymic asymmetry after 5-7 mo.). SD irradiation at either age did not increase the spontaneous leukemia incidence (2.7%), but the spontaneous incidence of other tumors (10.7% in controls, especially lung or adrenal adenoma, fibrosarcoma and angiosarcoma) increased to 33% in adults admin. SD radiation. FD radiation at age 25 days induced thymic and non-thymic lymphoma in 29% and 2%, resp. SD radiation induced extramedullary granulopoiesis (lymph nodes) and compensatory splenic hyperplasia after 20-28 and 17-20 days, resp. The bone marrow responses to SD and FD were about the same; SD induced chronic leukemia. Both SD and FD reduced the av. survival time. A literature review of radiation leukemogenesis in man and animals (128 references) is included.

69-697 TRANSFER OF FALLOUT STRONTIUM-90 TO COWS' MILK. (E.) Hardy, E. P., Jr. (U. S. Atom. Ener. Com., New York, N. Y.) and J. Rivera. J. Dairy Sci. 51(8):1210-1214, 1968.

Levels of ^{90}Sr in soil, alfalfa (and other fodder) and milk and the fallout rate were studied at the Colorado State University dairy farm (Fort Collins) during the growing seasons (April-October) of 1962-1966. Two dairy herds were studied: 80 cows pastured on a dry lot and 11-12 cows grazing on irrigated brome grass and alfalfa pastures (less than 5% of the total ^{90}Sr was added by irrigation water). Cumulative total ^{90}Sr fallout (April, 1962-October, 1966) was 59 mμC/m^2; 56% of this total (measured through October, 1965) was in the soil. Levels of ^{90}Sr in alfalfa were significantly higher in the first cutting (42% of the total) than in the next 2 cuttings (29% and 23%, resp.). Highest ^{90}Sr levels in the soil, alfalfa and milk were seen in 1963 (reflecting the intensive nuclear testing in 1962), the lowest in 1966. The transfer coefficients of ^{90}Sr from diet to milk were 0.05-0.09%/liter/day. Since calcium intake in these cows was high (140-200 g/day), most of the ^{90}Sr in the milk came from the fodder. Measured and calculated ^{90}Sr levels in milk were about the same. An equation for estimating ^{90}Sr levels in milk during the pasture season is given. It is noted that these values for fallout are probably applicable only to irrigated, arid areas; ^{90}Sr fallout levels at Fort Collins were about 50% of the levels in the northeastern states and about double the southwestern values.

9-698 LEUKEMOID REACTION AFTER ^{90}STRONTIUM INCORPORATION IN RATS. (Ger.) Boegler,
. (Heiligenberg Inst., Germany) and H. Kriegel.
lut 17(6):345-350, 1968.

n male Heiligenberg strain rats (4-5 wk. old)
dmin. 1 dose of ^{90}Sr-^{90}Y (10 µC = about 0.15
C/g body wt. i.p.), the av. survival time was
reatly reduced, from 1200 days (in untreated
ats) to a max. of about 915 days. Osteosarcomas
eveloped in 4% of the 52 animals, carcinomas
nd round or spindle cell sarcomas in 6% and
ematopoietic neoplasms in 78%. The hematopoietic
eoplasms included leukemoid infiltration of the
iver, lungs, spleen, lungs and kidneys, spleno-
egaly and tumors of the mediastinal and mesen-
eric lymph nodes; however, none of these tumors
howed signs of leukemic transformation. Periph-
ral blood changes were studied in 18 rats up to
900 days after treatment. Only 1/18 showed a normal total WBC (12,000-15,000); 3/18 showed leukocytosis up to 20,000 and 14/18 showed marked leukocytosis (up to 245% of normal). The normal differential WBC in these rats was 77% lymphocytes, 20% granulocytes, 2% monocytes and 2% eosinophils; after ^{90}Sr admin., the granulocytes increased by up to 238%, while the lymphocytes fell by as much as 64%. No signs of a leukemic differential WBC or leukemic transformation of the bone marrow were noted. Abnormalities of the peripheral granulocytes and lymphocytes in 1 animal studied 600 days after treatment included nuclear segmentation (43% of the cells), structural changes of the nucleus (18%) or cytoplasm (12%) and chromosomal aberrations (34%). The absence of leukemia in these animals was attributed to their shortened life span, which did not permit the isotope, with its long biological half-life, to exert its full effects.

See also abstract nos.: 682,789,864,869

69-699 DERIVATIVES OF FLUORENE. XXVII. NEW THIOFLUORENES RELATED TO METABOLISM OF THE CARCINOGEN N-2-FLUORENYLACETAMIDE. II. (E.) Namkung, M. J. (U. Washington Sch. Med., Seattle) and T. L. Fletcher. J. Med. Chem. 11(6):1235-1236, 1968.

The preparation of 8 fluorenylsulfones and thiofluorenes possibly related to the metabolites of N-acetoxy-N-2-fluorenylacetamide is described. One of these agents had slight antitumor activity (L-1210 mouse leukemia). Carcinogenic studies are not described.

69-700 DERIVATIVES OF FLUORENE. XXVIII. NEW THIOFLUORENES RELATED TO METABOLISM OF THE CARCINOGEN N-2-FLUORENYLACETAMIDE. III. (E.) Pan, H.-L. (U. Washington Sch. Med., Seattle), M. J. Namkung and T. L. Fletcher. J. Med. Chem. 11(6):1236-1237, 1968.

The synthesis of 1-, 5- and 7-methylthio-2-acetamidofluorene and their corresponding amines are described, to facilitate the search for these compounds as possible addition products of these biologically important esters of N-hydroxy-N-2-fluorenylacetamide with methionine derivatives in the liver. No biological data on these compounds are included.

69-701 CARCINOGENIC ACTIVITY OF ANALOGUES OF p-DIMETHYLAMINOAZOBENZENE. VII. EFFECT OF TWO METHYL GROUPS IN THE PYRIDINE SERIES. (E.) Brown, E. V. (U. Kentucky, Lexington) and B. J. Snider. J. Nat. Cancer Inst. 41(4):855-857, 1968.

Of 7 dimethyl-substituted derivatives of N,N-dimethyl-4-(4'-[pyridyl-1'-oxide]azo)-aniline (PO4') synthesized and tested in 8-wk.-old male Sprague-Dawley rats (0.03% or 0.06% in a low-protein, low-riboflavin diet), the only markedly effective carcinogen was 2',5'-dimethyl-PO4' (the tumors are not described). The other isomers were about as active as p-dimethylaminoazobenzene. The 3,5-dimethyl isomer could not be prepared.

69-702 TESTS FOR CHEMICAL CARCINOGENS. REPORT ON THE ACTIVITY OF DERIVATIVES OF AROMATIC AMINES, NITROSAMINES, QUINOLINES, NITROALKANES, AMIDES, EPOXIDES, AZIRIDINES, AND PURINE ANTIMETABOLITES. (E.) Hadidian, Z. (Mason Res. Inst., Worcester, Mass.), T. N. Fredrickson, E. K. Weisburger, J. H. Weisburger, R. M. Glass and N. Mantel. J. Nat. Cancer Inst. 41(4):985-1036, 1968.

Carcinogenic and chronic toxic effects of graded doses of 38 compounds (admin. as 5 p.o. doses/wk., 260 doses over 1 yr.) were tested in weanling Fischer rats (both sexes). The most frequent tumors in controls were interstitial cell tumors of the testis. Solitary tumors of types not seen in controls were induced by 11 compounds and 10 others were definitely carcinogenic, inducing hepatoma, mammary adenocarcinoma, oral carcinoma, premalignant hyperplasia of the forestomach epithelium, adenomatous or adenocarcinomatous forestomach polyps, bladder papillomas and ear canal carcinomas. The definite carcinogens included 2 quinolines, 2 derivatives of 2-naphthylamine, 1 alkylating agent, 4 nitrosamines and 1 other aromatic amine.

69-703 REACTION OF N-METHYL-N'-NITRO-N-NITROSOGUANIDINE WITH PROTEIN: FORMATION OF NITROGUANIDO DERIVATIVES. (E.) McCalla, D. R. (McMaster U., Hamilton, Canada) and A. Reuvers. Canad. J. Biochem. 46(11):1411-1415, 1968.

Modifications of the composition of purified bovine serum albumin (BSA; 10 mg/ml in phosphate buffer soln., pH 7) were studied by chromatography after 1-12 hr. of shaking in a saturated or unsaturated soln. of N-methyl-N'-nitro-N-nitrosoguanidine (NG; 10 or 1 mg/ml, resp.) at room temperature. NG-treated BSA showed a reduced number of lysine groups and conversion of the epsilon-amino groups of lysine to nitroguanido groups. The NG conc. required to form at least 1 nitroguanido group in a significant fraction of the BSA molecules was much higher than the conc. required to kill microorganisms or alkylate DNA in vitro. NG-treated BSA liberated nitrohomoarginine after enzymatic hydrolysis; NG also reacted with glycine to form nitroguanidoacetic acid.

69-704 LYSERGIC ACID DIETHYLAMIDE (LSD) BINDING TO DEOXYRIBONUCLEIC ACID (DNA). (E.) Yielding, K. L. (U. Alabama Med. Ctr., Birmingham) and H. Sterglanz. Proc. Soc. Exp. Biol. Med. 128(4):1096-1098, 1968.

In an attempt to elucidate the mechanism of LSD-induced chromosomal breakage, the binding of the D- and L- stereoisomers of LSD and of DL-2-bromo-LSD to purified calf thymus DNA was studied by UV spectrofluorometry. Addition of RNA to the LSD soln. (10^{-4} M) did not depress its absorbance spectrum at 310 mμ, but addition of DNA progressively depressed the absorption and fluorescence spectra of LSD. The K_d for D-LSD binding to DNA (calculated from spectral changes) was 5×10^{-4} M; each nucleotide residue was a potential LSD binding site. At pH 3, when DNA was nonhelical, no binding was noted. Binding was decreased by adding $MgCl_2$ (3.7×10^{-3} M) to DNA or heating the DNA before adding LSD.

69-705 ELECTRON SPIN RESONANCE STUDY ON THE INTERACTION BETWEEN THE CHEMICAL

CARCINOGENS AND TISSUE COMPONENTS. III. DETERMINATION OF THE STRUCTURE OF THE FREE RADICAL PRODUCED EITHER BY STIRRING 3,4-BENZOPYRENE WITH ALBUMIN OR INCUBATING IT WITH LIVER HOMOGENATES. (E.) Nagata, C. (Nat. Cancer Ctr. Res. Inst., Tokyo), M. Inomata, M. Kodama and Y. Tagashira. Gann 59(4):289-298, 1968.

The free radical formed by a mixture of 3,4-benzpyrene (BP; 5 mg) and bovine serum albumin (20 mg; aqueous soln.) after 5 days of stirring in the dark at 4° C, lyophilization and benzene extraction, was identified as a 5-phenoxy group by electron spin resonance (ESR) analysis. About 33% of this signal remained after repeated benzene extraction. Free radical formation under these conditions, which excluded an enzymatic reaction, was slow (3-4 days of stirring were required before the ESR signal appeared). Addition of BP (5 mg in 1 ml acetone) to the supernatant fraction from 15 g of rat liver homogenate (in about 220 ml buffered medium containing cofactors) resulted in the formation of the 5-phenoxy free radical after only 1 hr. of reaction at 37° C with air bubbling. These conditions permitted an enzymatic reaction, the importance of which was demonstrated by the reduced free radical formation after addition of BP to heated liver homogenate or the omission of the cofactors (triphosphopyridine nucleotide, nicotinamide and glucose-6'-phosphate). This 5-phenoxy free radical was apparently formed from 5-hydroxy-3,4-BP, which is highly unstable; 5-hydroxy-3,4-BP has been identified as a BP metabolite in rats although 8-hydroxy-3,4-BP is more commonly seen. The importance of free radical formation in carcinogenesis is discussed.

69-706 EFFECT OF THE GENETICALLY ACTIVE CARCINOGEN 1-NITROSO-2-IMIDAZOLIDINONE ON THE ULTRASTRUCTURE OF THE YEAST Rhodotorula rubra. (Ger.) Marquardt, H. (U. Freiburg I. Br., Germany) and U. von Rahden. Protoplasma 66(1-2):131-137, 1968.

Doses of 1-nitroso-2-imidazolidinone killing 59.5% or 88% of cells (0.5 and 10 mM, resp., for 30 min. at pH 7 and 20° C) had very little effect on the cytoplasm of Rhodotorula rubra, causing only a reduction of the endoplasmic reticulum and disruption of the microsomes. Both doses, however, caused marked nuclear changes, including mitotic gene conversion and recombination, mutation and chromosome breaks. The discrepancy between the nuclear and cytoplasmic responses to the agent was attributed to a specific attack on the structural components of the nucleus.

69-707 3,4-BENZPYRENE IN PETROLEUM. (Ger.) Gräf, W. (U. Erlangen-Nuremberg, Germany) and C. Winter. Arch. Hyg. Bakt. 152(4):289-293, 1968.

The 3,4-benzpyrene (BP) conc. of petroleum samples from Libya, Venezuela and the Persian Gulf was 132, 166 and 40 µg/100 ml, resp. Refined petroleum products (diesel fuel, heating oil, unused motor oil) had BP levels of 2.6 µg/100 ml, but motor oil from an engine run for 2200 km had a BP conc. of 580 µg/100 ml. Since the BP conc. in natural plant substances is only 1-2 µg/100 ml, contamination of food and drinking water by petroleum must be avoided.

69-708 CHRONIC THYROIDITIS IN BUFFALO STRAIN RATS INGESTING METHYLCHOLANTHRENE. (E.) Glover, E. L. (NCI, Bethesda, Md.) and M. D. Reuber. Arch. Path. (Chicago) 86(5):542-544, 1968.

In 12-wk.-old Buffalo strain rats fed 3-methylcholanthrene (MC; 0.033% in diet) for 12 wk. before sacrifice, body wt. loss was seen, especially in animals with thyroiditis. MC admin. induced thyroiditis, with hyperplasia of the acinar cells and focal plasma cell infiltration, in 8/11 females and 4/14 males. Foci of plasma cells were seen in the lymph nodes adjacent to the salivary glands, but not in the spleen or thymus. Other MC-induced lesions were narrowing of the zona fasciculata and widening of the zona reticularis of the adrenal cortex, and a few vacuolated basophils in the pituitary. Other organs including the liver were normal. The mechanism of MC-induced thyroiditis could not be determined.

69-709 MALIGNANT RETICULOSIS AFTER PHENYLBUTAZONE THERAPY. CAUSAL RELATIONSHIP OR A RANDOM COINCIDENCE? (Ger.) Lorenz, K. (Carus Med. Acad., Dresden, Germany) and P. Gebert. Munchen Med. Wschr. 110(40):2283-2287, 1968.

A 4-yr.-old boy with rheumatoid arthritis (arising from rheumatic fever) was treated with aminophenazone (at least 2 courses; 0.8 g/day in 1 course) and prednisone for 5 mo. Phenylbutazone (PB; each course 400 mg/day) was then added to the regimen; 4 courses of PB were admin. over the next 8 mo., the last supplemented by chloroquine diphosphate (doses not stated). Malignant reticulosis was identified after 17 mo. of treatment, when the pt. developed hepatosplenomegaly and lymphadenopathy; antileukemic therapy had no effect and the pt. died about 3 mo. later. Leukopenia (granulocytopenia) and lymphocytosis were present before aminophenazone was begun and were apparently exacerbated by PB; the total peripheral WBC never rose above 3800 after the diagnosis of malignant reticulosis. It is suggested that the pyrazolone derivatives (aminophenazone and PB) induced reticulosis by acting on a particularly susceptible bone marrow in this pt. The necessity for careful hematological examination before treatment with PB is stressed.

69-710 CYTOGENETIC STUDIES ON RAT LEUKEMIA INDUCED BY PULSE DOSES OF 7,12-DIMETHYLBENZ(α)ANTHRACENE. (E.) Kurita, Y. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan),

T. Sugiyama and Y. Nishizuka. Cancer Res. 28(9): 1738-1752, 1968.

Leukemia was induced in 26-day-old non-inbred Long-Evans rats (both sexes) by i.v. admin. of pulse doses of a lipid emulsion of 7,12-dimethylbenzanthracene (30 mg/kg every 7-12 days; 4-6 doses over 21-60 days); the animals were sacrificed when moribund, 48-120 days after the beginning of treatment. Examination of femoral bone marrow and splenic cells at the time of sacrifice showed modal or nonmodal cells with C-1 trisomy in 16/40 rats (5/16 with stemline cells characterized by both C-1 and A-6 trisomy; 16/16 with "hepatic type" leukemia). Unassociated A-6 trisomy was found in 4/40 (1/4 with chloroleukemia, 3/4 with "hepatic type" leukemia; 1/4 with modal hypodiploid cells with 41 chromosomes) and in the stemline of an additional rat with trisomic, C-1 positive, "hepatic type" leukemia. A metacentric or submetacentric marker chromosome was found in 4/40 (type of leukemia not specified). Tetraploid cells were seen in 1/40 (type of leukemia not specified). No chromosomal abnormalities were seen in 14/40 (12/14 with "hepatic type" leukemias; 1/14 each with lymphoblastic and "thymic" leukemia).

69-711 THE DEVELOPMENT OF RESISTANCE TO CARCINOGEN-INDUCED CYTOTOXICITY IN HAMSTER EMBRYO CULTURES. (E.) Diamond, L. (Wistar Inst. Anat. Biol., Philadelphia, Pa.), V. Defendi and P. Brookes. Exp. Cell Res. 52(1): 180-184, 1968.

Syrian hamster embryo cells (designated HE) became progressively more resistant to 7,12-dimethylbenzanthracene (DMBA; 0.01-1.0 μg/ml) after several subcultivations without carcinogen. The cell yield at the highest DMBA conc. increased from 19% in passage 2 to 67% in passage 20. No morphological transformation or evolution into established cell lines was noted, but the DMBA resistance of the HE cells after 15-20 subcultivations approached that of several tumor-inducing hamster cell lines, either spontaneously transformed (HE 44 or Nil-2) or polyoma virus-transformed (Nil-2/Py); cell yields in these transformed lines were 69%, 53% and 95%, resp., at the highest DMBA conc. The binding of ^{3}H-labeled DMBA (0.012 μg/ml, 1.0 μC/ml) to the cell surface or cellular constituents (DNA, RNA and protein) also decreased with subcultivation. Coverslip clones from primary HE cells showed heterogeneous DMBA binding capacities. The results suggested either that all cells in the primary population gradually acquired DMBA resistance, or that continual selection took place in favor of resistant cell variants present in the primary population.

69-712 MORPHOLOGICAL CONVERSION, HYPERCONVERSION AND REVERSION OF MAMMALIAN CELLS TREATED IN VITRO WITH N-NITROSOMETHYLUREA. (E.) Sanders, F. K. (MRC Labs., Carshalton, Surrey, England), B. O. Burford. Nature (London) 220(5166):448-453, 1968.

The effects of N-nitrosomethylurea (NMU) on several transformed, spontaneously malignant and untreated cell lines were studied. The ID_{50} of NMU (reducing plating efficiency 50%) was 24-40 μg/ml in Rous sarcoma virus (RSV)-induced XC rat tumor cells, tumor-inducing L-929 mouse fibroblasts and 2 lines of untreated Chinese or Syrian hamster cells (CH/L male lung and BHK21/13, resp.). In these cells an in 2 lines more sensitive to NMU (HeLa human cance and CH/O Chinese hamster ovary: ID_{50} 4-6 μg/ml), the morphological response to NMU in the surviving cells was "conversion" of the monolayers to multilayered cultures of random growth patterns; some of these cells were capable of inducing tumor in vivo after NMU treatment. The ID_{50} of NMU was 4.5-8.5 μg/ml in several tumor-inducing cell lines RNPH rat nephroma, BHK21/13/Py6 (polyoma virus-transformed BHK21/13) and cell lines derived from CH/L by natural selection (CH/LAg), SV40 transformation (CH/LSV40) or treatment with 3,4-benzpyrene (CH/LBP) or 8-methylcholanthrene (CH/LMCh). In these cells, the morphological response to NMU in surviving cells was even further alteration of the already altered cell morphology ("hyperconversion" An equally sensitive cell line, RSCH Chinese hamster fibroblasts (from cells cocultivated with RSV converted chick embryo cells; not producing RSV bu with the RSV genome) showed a mixed response; some cells reverted to the morphology of normal hamster fibroblasts, while others showed conversion.

69-713 MEASUREMENT AND DETERMINATION OF VARIOUS POLLUTANTS IN INDUSTRIAL AREAS. (Fr.) Nenquin, G. (Nat. Inst. Mines, Brussels). Arch. Belg. Med. Soc. 26(4):249-267, 1968.

After a discussion of several methods of determining air pollutants, results of recent studies (since 1965) using the Owen rain gauge in the industrial areas (predominantly iron and steel works) of Charleroi and Vilvorde are presented. In Vilvorde, the minimum and max. levels of solid pollutants were 200-400 mg and 0.7-1.0 g/m^2/day, resp., the highest levels being seen in an area near a coke oven and a ball bearing plant. In Marcinelle, a community south of Charleroi with steel mills to the east and northeast, the av. level of solid pollutants was 0.2-0.332 g/m^2/day. Similar high levels of solid pollutants were seen in a factory district of Charleroi (Dampremy). The 1966 and 1967 levels of solid pollutants were about the same. Sulfur pollution levels ranged from a minimum of 35-60 to a max. of 100-250 mg/m^2/day in 1966; in 1967, when the rainfall was lower, the minimum was 25-45 and the max. 60-150 mg/m^2/day. The greater proportion of solid pollutants in both cities consisted of iron, followed by other minerals traceable to the metallurgical industries, especially the foundries.

69-714 METHODS OF STUDY OF THE EFFECT OF AIR POLLUTION ON THE POPULATION. (Rus.)

Tkachev, P. G. (Novosibirsk Sci. Res. Inst. Sanit., U.S.S.R.) and A. A. Gladkovskaia. Gig. Sanit. 33(7):92-93, 1968.

Thresholds of olfactory sensitivity to irritants were studied in 530 children (age 9-12 yr.), most of whom lived 300-1500 m from a factory manufacturing aliphatic amines (Group I; the max. single amine level in air was 1.478 mg/m^3; av. daily level 0.293 mg/m^3); the others lived 12-15 km away from the factory (Group II; av. air amine level 0.06 mg/m^3). The threshold sensitivities of thymol in Groups I and II were 10.4 and 9.9 ml/m^3, resp., compared to 8.1 and 8.4 ml/m^3, resp., for camphor and 6.0 and 6.5 ml/m^3, resp., for tar. These results were within the limits seen by others in normal children (av. 10, 8 and 6.5 ml/m^3 air, resp.; range 4-15, 4-12 and 3-10 ml/m^3, resp.). The olfactory sensitivity threshold to a mixture of specific irritants and amines, however, was increased in Group I (3.0 ml/m^3, compared to 2.3 ml/m^3 in Group II; normal, 1-4 ml/m^3). The irritant threshold of this mixture was about the same in both groups (av. 3.4 ml/m^3), but the reaction to irritating levels of the mixture was stronger in Group II children. The reduction of olfactory sensitivity to air irritants was seen in Group I children who had lived near the factory for 1.5-2 yr. or more.

69-715 DEGREE OF MALIGNANCY AND ALLOWABLE CONCENTRATION OF PNEUMOCONIOSIS PROVOKING DUST. (Jap.)

Sano, T. (Inst. Sci. Labor, Tokyo). Rodo Kagaku (J. Sci. Lab.) 44(2):73-96, 1968.

Clinical and pathological findings of about 550 autopsy cases of occupational pneumoconiosis (from Japan) were studied. The malignancy potential of lesions caused by dust inhalation depends on several factors: dust retention by the alveoli, the degree of collagen fiber production or tissue necrosis in dust-containing foci, the amount of bronchial or bronchiolar irritation, and the relationship between the amount of dust retained and the size of the dust-containing pulmonary foci. The malignancy potentials in chronic pneumoconiosis (the pathological changes in acute pneumoconiosis are about the same irrespective of the type of dust) are discussed. The permissible conc. (Japan Association of Industrial Health, 1965) of industrial dusts depends on their potential ability to cause malignant tumors. The malignancy potential is high for dusts causing early, marked fibrosis (talc, pyrophyllite, pyrite, etc.), marked bronchiolar changes (aluminum, asbestos, diatomaceous earth) or marked fibrosis (high silica dusts) and the permissible conc. is 2 mg/m^3. The permissible conc. for dusts of moderate malignancy potential (low silica dusts, iron oxides, perhaps organic plant dusts causing marked bronchiolar changes) or low malignancy potential (carbon dusts causing weak fibrosis) is 5 mg/m^3. For dusts of unknown malignancy potential, the permissible conc. is 10 mg/m^3. Analysis (X-ray diffraction, fluorescent X-ray analysis, etc.) of dust particles from pts. with several types of pneumoconiosis showed significant quantities of large dust particles (which tend to cause bronchiolitis and a strong foreign-body reaction); dust particles over 5 and 10 μ in diameter accounted for 4.18% and 2.18% of the total in asbestosis, resp., 8.1% and 1.19% in graphite lung, resp., 19.3% and 7.1% in active carbon lung, resp., and 26.3% and 2.6% in talc lung, resp. In 1 pt. with classical silicosis and several types of dust particles in the lungs, particles over 5 and 10 μ in diameter were 3.85% and 1.34% of the total, resp. Measures to prevent the inhalation of such large dust particles are discussed.

69-716 CONCENTRIC BODIES IN URETHAN-INDUCED PULMONARY ADENOMAS IN MICE. (Hun.)

Baló, J. (Med. U. Budapest), G. Kendrey and J. Veres. Magy. Onkol. 12(2):83-89, 1968.

The ultrastructure of urethan (1 g/kg i.p.)-induced lung adenomas in strain db mice was studied. The tumor cells showed nuclear inclusion bodies arising from cytoplasmic invagination. Cytoplasmic inclusion bodies were also seen, consisting either of an electron-dense material of unknown nature or of smooth membranes with a frequently concentric structure. The concentric inclusion bodies consisted of membranes with an osmiophilic outer zone (100-150 Å wide) and a wider inner zone of low electron density (150-200 Å) containing a slightly osmiophilic middle zone (90-100 Å). Transverse sections of the membranous inclusion bodies showed a gridlike structure. These inclusion bodies were believed to be associated with the secretory function of the cells.

69-717 EXPERIMENTAL STUDIES OF THE RETENTION, DISTRIBUTION AND METABOLISM OF CARCINOGENIC HYDROCARBONS IN THE RESPIRATORY TRACT. (Ger.)

Dontenwill, W. (Inst. Sci. Res. Cig. Indust., Hamburg, Germany), H. Elmenhorst, G. Reckzeh, H.-P. Harke and L. Stadler. Z. Krebsforsch. 71(3):225-243, 1968.

The effects of carboxymethylcellulose (CMC), polyethylene oxide (Lutrol; molecular wt. about 400) and other solvents on the absorption and distribution of aerosol or intratracheally inj. 3,4-benzpyrene (BP) and 7,12-dimethylbenzanthracene (DMBA) were studied in male Syrian golden hamsters. Aerosol application did not permit carcinogenic doses of the compounds to reach the lungs. Admin. of the hydrocarbons in true soln. resulted in rapid absorption, especially with DMBA. BP was absorbed most rapidly when dissolved in Lutrol or sesame oil; addition of soot to a BP-Lutrol soln. slightly inhibited absorption.

Absorption of BP was retarded when the vehicle was CMC-saline or hematite in saline. Aerosol or intratracheal treatment with soot retarded the absorption of subsequently admin. carcinogens. The carcinogens were found in the blood within a few min. after inj. and were excreted unchanged (in small quantities) or as metabolites in the feces; most of the dose disappeared from the lungs after 2 days and from the body after 5 days.

69-718 ABSENCE OF A CARCINOGENIC ACTION OF COTININ IN RATS. (Ger.) Schmähl, D. (German Cancer Res. Ctr., Heidelberg, Germany) and H. Osswald. Z. Krebsforsch. 71(2):198, 1968.

A 50% aqueous soln. of cotinin (C; a relatively nontoxic, physiological metabolic byproduct of nicotine) was admin. p.o. as drinking water to 60 BR-46 rats (both sexes), beginning at age 100 days (mean 200 g) and continuing until death (mean 630 days; max. 750 days). The estimated av. intake of C was approx. 30 mg/kg/day in a total fluid intake of 10-15 ml/day; the mean total dose was approx. 19 g/kg and the max. was 22.5 g/kg. Only 1 malignant tumor developed (1.8%), a hepatocellular carcinoma in a male rat dying after 690 days of treatment. The incidence of benign tumors, including mammary fibroma or fibroadenoma and thymoma, was no greater than in untreated controls.

69-719 LIQUID CONTENTS OF TOBACCO SMOKE. PREPARATIVE SEPARATION OF A GAS PHASE CONDENSATE. (Ger.) Elmenhorst, H. (Inst. Sci. Res. Assoc. Cig. Indust., Hamburg, Germany) and H.-P. Harke. Z. Naturforsch. [B] 23(9):1271-1272, 1968.

The gas phase of smoke condensate from 2000 cigarettes (of an unspecified German blend) was separated from N_2, O_2, CO and other gases (the method is described) and the residue was analyzed by gas chromatography. An 85-mm cigarette smoked to a 23-mm butt yielded about 18 mg of gas; about 1.8 mg of this gas phase was oily and the other 16 mg was watery (mostly water, with few organic components). Analysis of the oily fraction yielded 20 large chromatographic peaks, 8 of which were identified as benzene, p-, m- and o-xylene, ethylbenzene, toluene, styrene and limonene. Analysis of the gas phase of the condensate obtained by this method yielded levels of acrolein, aldehydes (calculated as acetaldehyde), pyridine and phenols of 6, 300, 16 and 30 µg/cigarette, resp. By comparison, the "native" gas phase (obtained by filtration of the smoke through a Cambridge filter) of similar cigarettes contained 60, 1800, 7 and about 3 µg/cigarette of acrolein, aldehydes, pyridine and phenols, resp.

69-720 SELECTIVE VENTING OF CIGARETTE SMOKE IN DICHOTOMOUS DUCTS AND PRESERVED HUMAN BRONCHI. (E.) Anderson, A. E., Jr. (Baptist Mem. Hosp., Jacksonville, Fla.), J. A. Furlaneto and A. G. Foraker. Science 162(3854): 668-669, 1968.

The distribution of mechanically generated tobacco smoke was studied in 2 systems simulating the pathway of smoke in the human lung in vivo: glass Y-tube couplings or fume-fixed, inflated and hardened normal human lungs, with sections removed to expose the air passages from the apices to the bases of the upper and lower lobes. When the air passages were at ambient temperature (26° C), the smoke settled into the lower branches. In air passages warmed to 37° C, the inj. smoke rose to the upper branches, especially after very slow smoke inj. If smoke inj. was very vigorous, the impetus of the smoke overcame its buoyancy and the distribution was about the same in all air passages. The selective distribution of the smoke resembled the pattern of distribution of centrilobular emphysema (which is found predominantly in the apices and upper lobes, with a higher incidence in smokers than in non-smokers).

69-721 CIGARETTE SMOKE: PROTECTION OF ALVEOLAR MACROPHAGES BY GLUTATHIONE AND CYSTEINE. (E.) Green, G. M. (Harvard Med. Sch., Boston, Mass.). Science 162(3855):810-811, 1968.

The effects of cigarette smoke (CS; 6 ml), cysteine (0.625-2.50 µmole/ml) and glutathione (0.025-2.5 µmole/ml) on the phagocytosis of Staphylococcus albus (about 10^5 bacteria/culture) by rabbit pulmonary alveolar macrophages in vitro (about 10^6 cells/2 ml medium with 5% autologous rabbit serum) were studied. In control preparations or preparations containing cysteine or glutathione (each 2.5 µmole/ml), 60-80% of the bacteria were killed after 2 hr. at 37° C. CS alone reduced bacterial phagocytosis to 1.2%, but this response was blocked by either cysteine or glutathione at the highest conc. The effects of 1 ml of CS were neutralized by 0.2-0.24 µmole of cysteine and a slightly lower conc. of glutathione. This phagocytoxic effect depended on the presence of proteins from whole or dialyzed rabbit serum; in serum-free medium CS was nontoxic, phagocytic activity was reduced and cysteine was inactive. The protective effects of the sulfhydryl-containing agents suggested an oxidant action of CS on the lung cells.

69-722 INDUCTION OF MALIGNANT LYMPHOMAS IN ICR MICE TREATED WITH CIGARETTE TAR. (E.) Takayama, S. (Cancer Inst., Tokyo) and H. Sugano. Gann 59(4):363-365, 1968.

In 8-wk.-old ICR mice (both sexes) painted for 1 yr. with a 10% or 50% acetone soln. of cigarette tar (3 doses/wk.) and observed for 620 and 420 days, resp., the 210-day survival rates were

15/20 and 40/40, resp. Tumors induced by the lower and higher doses of tar included myeloproliferative disorders (1/15 and 15/40, resp.), lung adenoma (2/15 and 1/40, resp.), skin papilloma (5/15 and 6/40, resp.), lung carcinoma, liver adenoma and adenomatous hyperplasia of the glandular stomach (1 animal in each group). The larger dose also induced skin carcinoma, papillary cystadenocarcinoma of the kidney and ovarian cysts in 6/40, 2/40 and 4/40, resp. The lower and higher doses of tar also induced lymphomas in 1/15 and 10/40, resp., identified histologically as lymphocytic (6), Type A reticulum cell (2) or granulocytic (3). Nearly all animals with lymphoma showed lymphadenopathy and splenomegaly, but s.c. transplants of enlarged spleens from 4 mice did not develop into tumors in adult ICR recipients. Tumors in 20 control ICR animals (observed for 420 days) included 2 mammary tumors and 1 myeloproliferative disorder (all in females; the 10 males developed no tumors).

69-723 CARCINOMA OF BRONCHUS AND THE SMOKING HABIT IN RHODESIAN AFRICANS. (E.)

Gelfand, M. (U. Coll. Rhodesia, Salisbury), A. J. P. Graham and E. Lightman. Brit. Med. J. 3(5616):468-469, 1968.

The smoking habits of 32 African men (most in the 41-50 age group), admitted to the Harare Hospital (Salisbury) from 1959-1967 with histologically confirmed bronchogenic carcinoma, were compared to those reported by 32 randomly selected, age-matched control men. Regular smoking (defined as 1 cigarette/day or 8 g/wk. of tobacco smoked for at least 1 yr.) was reported by 28/32 (87.5%) with cancer and 7/32 (21.9%) controls; 1/32 and 0/32, resp., smoked pipes; 1/32 and 5/32, resp., were ex-smokers; and 2/32 and 20/32, resp., were non-smokers of at least 1 yr. duration. Cigarette consumption in the cancer pts. who smoked was 1-10/day in 19/28 (67.8%), 11-20/day in 5/28 (17.8%) and over 20/day in only 4/28 (14.3%). The type of cigarettes smoked varied; many pts. smoked factory-made cigarettes in town and home-grown tobacco at home. Most were believed to inhale and nearly all smoked the cigarettes to very small butts. The significant difference in cancer incidence between smokers and non-smokers was attributed to cigarette consumption rather than to such factors as air pollution.

69-724 HYDROLYSIS OF CYCASIN BY β-D-GLUCOSIDASE IN SKIN OF NEWBORN RATS. (E.)

Spatz, M. (NIH, Bethesda, Md.). Proc. Soc. Exp. Biol. Med. 128(4):1005-1008, 1968.

Results of several in vitro studies using skin homogenates from fetal, newborn and young Fischer and Sprague-Dawley (conventional or germfree) rats suggested that the enzyme responsible for the deglucosylation of cycasin to its aglycone (methylazoxymethanol) is the same β-D-glucosidase that is responsible for the release of o- and p-nitrophenol from o- and p-nitrophenyl-β-D-glucoside. Enzyme activity was highest in fetal and newborn rats (6 days before birth to about 2 days after birth), then fell steadily to age 30 days. No strain differences were seen. Enzyme activities were about the same in skin homogenates from conventional and germfree Sprague-Dawley rats.

69-725 CLINICAL AND HISTOLOGICAL STUDIES OF DRUG-INDUCED ARSENIC TUMORS. (Ger.)

Ehlers, G. (U. Giessen, Germany). Z. Haut. Geschlechtskr. 22(43):763-774, 1968.

A questionnaire (1963) of 1544 German dermatologists, to which 845/1544 (54.7%) replied, showed that 591 dermatologists (73%) employed 1-15 different preparations containing arsenic (As) in their practices. However, a comparison of the 1961 and 1963 editions of the Rote Liste with the 1967 edition showed that 36/60 listed As-containing preparations have either been removed from the list entirely or modified to eliminate inorganic As. Examination of 120 skin biopsies from As-treated pts. (seen by the author since 1959) showed keratosis or leukoplakia in 8.3% (10/120), Bowen's disease or cutaneous horns in 15.8% (19/120), reticulum cell sarcoma in 0.8% (1/120) and various types of carcinoma in 75% (basal cell in 57 pts., spinocellular in 17 pts., other types in 16 pts.). From 1959-1967, 17 men and 8 women (age 30-78 yr.; 12/25 aged 51-60 yr.) with As-induced skin lesions ranging from melanodermia and keratosis to premalignant and malignant tumors were seen. The time elapsed since the first As exposure was known in 21/25, but no definite time relationship was apparent (10-20 yr. in 9/21, 21-30 yr. in 8/21, 41-50 yr. in 4/21). It is concluded that exposure to As-containing drugs (an estimated 150,000 pts. with psoriasis in West Germany have received As at some time) is as dangerous to the skin as occupational As exposure.

69-726 SPONTANEOUS PARTIAL REGRESSION OF 9-10 DIMETHYL 1-2 BENZANTHRACENE-INDUCED EPITHELIAL ATYPIA IN THE HAMSTER CHEEK POUCH. (E.)

Levij, I. S. (Hebrew U.-Hadassah Med. Sch., Jerusalem, Israel), J. Rwomushana and A. Polliack. Israel J. Med. Sci. 4(4):913-916, 1968.

Two groups of male Syrian golden hamsters of a local strain (1.5-2 mo. old) were treated with 7,12-dimethylbenzanthracene (DMBA; 0.5% in liquid paraffin) by bilateral cheek pouch painting for 6 wk. (3 doses/wk.). In 6 animals sacrificed immediately after DMBA was stopped, all cheek pouches showed small papillary tumors (1-2 mm in diameter) on gross examination; microscopic examination showed benign papillomas with foci of epithelial atypia resembling intraepithelial carcinoma in all pouches. The other 6 animals were kept without further treatment for 2 mo.

after DMBA was stopped, before sacrifice. In this group, 6/12 cheek pouches were macroscopically normal and the others showed 1-2-mm papillary tumors, which were identified microscopically as benign papillomas with foci of acanthosis. No intraepithelial carcinomas were seen in this group. Additional evidence of partial regression of DMBA-induced cellular changes in this group was demonstrated by a reduction in nuclear size in the epithelial lesions. The discrepancy between these results and those of similar studies in hamsters could not be explained, although a strain difference may be responsible.

69-727 COMPARATIVE CARCINOGENIC ACTIVITY OF DIMETHYL AND TRIMETHYL DERIVATIVES OF BENZ(a)ANTHRACENE IN FISCHER LINE 344 RATS. (E.) Dunning, W. F. (U. Miami, Coral Gables, Fla.), M. R. Curtis and M. Stevens. Proc. Soc. Exp. Biol. Med. 128(3):720-722, 1968.

Tumors (s.c. sarcomas) developed at the site of inj. after an av. of 185.8 days in 50/52 (96%) surviving Fischer line #344 rats admin. 4,5-dimethylbenz(a)anthracene (4 mg in 2 doses s.c.) and after an av. of 169.6 days in 53/54 (98%) surviving rats admin. the same dose of 4,5,10-trimethylbenz(a)anthracene. No significant sex difference was observed with either compound. Tumors induced by the trimethyl derivative showed a significantly shorter av. latent time and were probably more malignant than those produced by the dimethyl derivative; metastases developed in 20% and 6% of the rats, resp. Most of the tumors were fibrosarcomas, with a few myogenic tumors. Both compounds were more active than the 3 most active monomethyl derivatives of benzanthracene.

69-728 NEW STUDY ON THE INFLUENCE OF THE NATURE AND NUMBER OF SUBSTITUENTS ON THE CARCINOGENIC ACTIVITY OF ANGULAR BENZACRIDINES. (Fr.) Lacassagne, A. (Radium Inst., Paris), N. P. Buu-Hoï, F. Zajdela, N. B. Giao, P. Jacquignon and M. Dufour. C. R. Acad. Sci. [D] (Paris) 267:981-983, 1968.

The induction of s.c. sarcomas by 6 benzo(a)-acridines (BAA; total 1.8 mg for 5/6 compounds, 3 mg for 1/6) and 6 benzo(c)acridines (BCA; total 3 mg for 5/6 compounds, 1.8 mg for 1/6) was studied in strain XVIInc/Z mice of both sexes (3 s.c. inj. at 1-mo. intervals in olive oil vehicle). The only active agent of the BAA series had a strong electron-donor group (10-amino-; 2/28 developed tumors, the first after 202 days); 2 compounds with electron-acceptor groups were inactive. Although the carcinogenic effect of the BAA series is related to variations of the charge on the K region, there were 3 exceptions in this group (1 hexamethyl- and 2 pentamethyl- derivatives). The most active compound in the BCA series was 7-formyl-9-methyl-BCA (tumors in 6/8 males and 6/8 females), followed by 7-formyl-11-methyl-BCA (tumors in 1/6 males and 4/6 females). The 7-cyano- derivative had little activity (1/6 females and 0/6 males developed tumors). All of the BCA derivatives had electron-acceptor substituents; the most active were those in which the unfavorable effect of this group (the aldehyde function) was overcome by an electron-donor group (methyl).

69-729 EFFECT OF EXOGENOUS AND ENDOGENOUS FACTORS ON TUMOR INDUCTION TIME. (Ger.) Dontenwill, W. (Inst. Sci. Res. Cig. Indust., Hamburg, Germany) and G. Reckzeh. Z. Krebsforsch. 71(3):215-224, 1968.

Skin carcinogenesis after topical application of 3,4-benzpyrene (BP; 3 doses/wk. of 0.2 ml acetone soln.; total 12-189 μg over up to 25 wk.) was studied in several groups of female ICI mice. In mice admin. BP at the highest dose, the tumor incidence was 100% whether treatment was extended over 10 or 25 wk. (carcinomas developed in 94.2% and 99.5%, resp.), but the mean induction times were 18.2 and 15.0 wk., resp. At 60 μg, BP induced carcinomas and papillomas in 190/195 and 2/195, resp., with mean induction times of 18.7 wk. At 12 μg of BP, 90% developed tumors (carcinoma and papilloma in 339/375 and 2/375, resp.) after a mean of 33.6 wk. Seasonal differences were seen in 2 groups admin. the highest or lowest BP doses beginning in November, 1965 (compared to November, 1964 and March, May and August, 1965); these groups showed a delayed induction. Other differences in tumor induction times were seen in several groups of mice admin. the lowest BP dose; these could not be explained by known endogenous or exogenous factors (environmental conditions were controlled in all groups).

69-730 EFFECT OF VITAMIN E AND PROPYL GALLATE ON THE CARCINOGENIC ACTIVITY OF BENZPYRENE IN THE MOUSE. (It.) Bonmassar, E. (U. Milan, Italy), R. Dallavalle and G. Giuliani. Tumori 11(1-2):245-250, 1968.

In female Swiss mice (about 50 days old; 10 mice/group) treated with 3,4-benzpyrene (BP; 100 μg/day x 20 s.c.) in a 1 mg/ml soln. of ethyl oleate, s.c. sarcomas appeared after 9-10 wk. and the mortality rate 28 wk. after the beginning of the study was 100%. Addition of the antioxidant propyl gallate (0.05%) to the BP-containing vehicle did not affect the time of tumor development, but the 28-wk. mortality rate fell to 70%. Addition of 0.03% α-tocopherol to the BP-containing vehicle accelerated tumor development (tumors appeared within 5-6 wk.), but most of these mice later showed spontaneous tumor regression and the 28-wk. mortality rate was only 30%. It is suggested that this tumor regression may have resulted from stimulation of an immune process by the possibly high antigenicity of the rapidly induced tumors.

9-731 THE SENSITIZING CARCINOGENIC EFFECT OF SMALL DOSES OF CARCINOGEN. (E.) Neiman, J. M. (Inst. Nutrition, Moscow). Europ. J. Cancer 4(5):537-545, 1968.

Several groups of C57BL, CC57BR and non-inbred white mice (3 mo. old; most groups were all males) were sensitized by short courses of non-carcinogenic doses of 3-methylcholanthrene (MC), 3,4-benzpyrene (BP) or 7,12-dimethylbenzanthracene (DMBA) by topical application, followed by larger doses of the same carcinogen (MC by s.c. inj. in 1 group; topically in the others) after 8-14 wk. without treatment. Mice in 2 experiments were sensitized with small doses of o-aminoazotoluene (AAT; p.o., s.c. or topically; doses were insufficient to induce hepatoma) and later treated with carcinogenic doses of DMBA or BP (topically). Skin papillomas appeared earlier and showed earlier malignant transformation in mice presensitized with the carcinogens in small doses, whether the carcinogens were subsequently applied to the same area of the skin, applied topically to a different area (1 experiment with MC) or admin. s.c. (another experiment with MC, inducing s.c. sarcomas and occasional skin tumors at the site of sensitization). Papilloma and carcinoma development after DMBA or BP admin. was also accelerated by prior treatment with AAT. It is concluded that even non-carcinogenic doses of carcinogens enhance the host susceptibility to subsequent carcinogenic influences.

69-732 POLYMER TUMORIGENESIS: MULTIPLE PRENEOPLASTIC CLONES IN PRIORITY ORDER WITH CLONAL INHIBITION. (E.) Brand, K. G. (U. Minnesota Med. Sch., Minneapolis) and L. C. Buoen. Proc. Soc. Exp. Biol. Med. 128(4):1154-1158, 1968.

CBA mice (12-16 mo. old), implanted s.c. with 15 x 22 mm "Disposlip" plastic films, developed tissue capsules around the plastic, which were transplanted s.c. into CBA-T6 mice after 27 wk. of development in the donors. Transplantation of the tissue capsules only did not induce tumors in the recipients up to 17 mo. later. Tumors developed in 6/15 recipients of tissue capsules containing the old plastic films and in 9/15 implanted with tissue capsules containing new plastic sheets. Since all of these tumors were negative for the T6 marker chromosome, they had developed from premalignant donor cells which could not progress to malignancy in the absence of the plastic. Further studies demonstrated that the premalignant cells present on the film induced tumors in preference to premalignant cells in the capsule (which developed into tumors only if a cell-free plastic was present). The premalignant cells on the plastic consisted of multiple, karyologically distinct clones, 1 of which became malignant in preference to the others (apparently by specific inhibition of premalignant processes in the secondary clones).

69-733 A COMPARISON OF THE TUMOURIGENIC EFFECT OF FIVE GRADED DOSES OF 3-METHYLCHOLANTHRENE APPLIED TO THE SKIN OF HAIRLESS MICE AT INTERVALS OF 3 OR 14 DAYS. (E.) Iversen, U. (U. Oslo, Norway), O. H. Iversen and R. Bjerknes. Acta Path. Microbiol. Scand. 73(4):502-520, 1968.

Hairless (hr/hr) mice of both sexes (about 15 wk. old) were treated topically with 5 doses of a benzene soln. of 3-methylcholanthrene (MC; 8-500 µg/dose) at 14-day intervals and the tumor incidence was observed for up to 19 mo. The total final tumor incidence (papillomas + carcinomas) increased logarithmically with the MC dosage, from 39% at 8 µg x 5 to 83% at 63 µg x 5; at the 2 highest doses (125 and 500 µg x 5) the final tumor incidence was 93% and 96%, resp. The mean number of tumors/mouse increased from 1.2 at the lowest dose to 7.2 at the highest dose. The av. latent period for the first 3 papillomas was 3.2 mo. at the lowest dose and 2.2 mo. at the highest dose. This regimen of MC application at 14-day intervals was more carcinogenic than treatment at 3-day intervals at the same doses in a similar group of mice (previously reported). The most marked difference between these 2 groups was the marked increase in the total and individual carcinoma incidence and the reduced latent period for carcinoma development in the mice treated at 14-day intervals.

69-734 ALTERED SURVIVAL TIMES OF MURINE SKIN ALLOGRAFTS FROM CANCER-BEARING DONORS. (E.) Kaliss, N. (Jackson Lab., Bar Harbor, Me.) and R. B. Suter. Transplantation 6(7):844-848, 1968.

Skin graft survival was studied in 7-9-mo.-old female C57BL/Ks (H-2^{d}) mice. Donors were female mice of several other strains with or without tumors; skin grafts from non-tumor-bearing donors were used as controls. No changes in survival time were seen in grafts from 1-yr.-old retired breeders of strains A/HeJ (H-2^{a}) or C3H/HeJ (H-2^{k}) with spontaneous mammary carcinomas, or grafts from C57L/J (H-2^{b}) mice with sarcomas induced 5 mo. previously by 1 inj. of 3-methylcholanthrene (MC; 0.25 mg s.c. in trioctanoin). Other donors were 3-4 mo. old. Skin grafts from A/J (H-2^{a}) mice with s.c. implanted leukemia (originally induced by X-rays in an A/J female) showed accelerated rejection. The survival of skin grafts from A/J or DBA/2J (H-2^{d}) mice with ascites or solid transplants of Sarcoma I (originally induced by dibenzanthracene in a Strain A mouse) was increased. No change in graft survival was seen in grafts from DBA/2J mice with s.c. transplanted SaD2 sarcoma (originally induced by MC in a DBA/2 female mouse). Acquisition of tumor antigens by normal tissues of tumor-bearing animals may account for both delayed and accelerated graft rejection. Delayed rejection may also be related to immunological enhancement, mediated by autoantibodies.

69-735 PHOSPHOLIPIDS (PL) RETARD AND CHOLESTEROL (CHOL) PROMOTES THE FORMATION OF TUMOURS INDUCED BY CARCINOGENIC HYDROCARBONS. (E.) Altman, R. F. A. (Nat. Inst. Cancer, Rio de Janeiro), O. Pugachiov, I. Ballini-Kerr and D. J. Da Silva. Z. Naturforsch [B] 23(9):1277-1279, 1968.

The effects of cholesterol (C), purified phosphatidylcholine (PC) and the purified preparation Asolectin (contains 29.5% PC + 29.5% phosphatidylcolamine + 31.6% phosphatidylinositol) on 3-methylcholanthrene (MC; 0.5 mg in 0.2 ml trioctanoin) carcinogenesis were studied in male Swiss mice. All compounds were admin. simultaneously in 1 s.c. inj. In mice admin. MC alone, the av. latent period (the time at which 50% of the group had developed tumors) was 9.1 wk. in 1 group and 11.5 wk. in another. Admin. of C (20 mg) did not affect the latent period in the former group (8.8 wk.) but reduced it in the other group (6.8 wk.). Purified PC (20 mg) increased the av. latent period (13.4 wk.). In mice admin. MC (same dose) + C (10 mg) + PC (30 mg), the av. latent period was 12.3 wk. Asolectin (50 mg) also prolonged the av. latent period (15.6 wk.) in MC-treated mice; in mice admin. MC + Asolectin (same doses) + C (20 mg), the av. latent period was reduced to 8.1 wk. It is suggested that phospholipids retard carcinogenesis by forming complexes with the carcinogen which cannot penetrate the cell membrane, and that C promotes carcinogenesis by liberating the carcinogen from this phospholipid complex. The failure of phospholipids to inhibit MC carcinogenesis completely in this experiment may be related to the ratio between phospholipids and C in the tissues.

69-736 CYTOCHEMICAL STUDY OF INDUCED MALIGNANT TUMOURS IN RAT. (E.) Talukdar, G. and A. K. Sharma. Indian J. Exp. Biol. 6(2):67-69, 1968.

In inbred 6-wk.-old white rats treated for 6 wk. with 3-methylcholanthrene (2 inj./wk. s.c. of 0.25 ml of 0.5% olive oil soln.) or 3,4-benzpyrene (same doses), large fibrosarcomas developed at the inj. site (abdominal wall) within 3 mo. The cytochemical changes seen in the tumors were similar: increases in both nucleic acids and proteins, a high RNA conc. in the nucleolus and cytoplasm, high DNA precipitation in the nuclear membrane and high conc. of alkaline phosphatase in the nucleolus. Arginine, tyrosine and histidine were increased; the tyrosine and histidine were mostly in the nucleolus and the arginine in the cytoplasm. Phosphatase activity was correlated with a high nuclear RNA content.

69-737 TRANSPLACENTAL CARCINOGENIC ACTIVITY OF DIETHYLNITROSAMINE IN RATS. (Ger.) Thomas, C. (U. Bonn, Germany) and R. Bollmann. Z. Krebsforsch. 71(2):129-134, 1968.

Wistar rats were treated with diethylnitrosamine (DENA; 25 or 50 mg/kg x 1 s.c. or 80-310 mg/kg in various p.o. regimens) during pregnancy; some females received 1 more p.o. dose of DENA (100 mg/kg) shortly before parturition. Of the pregnant females, 11/20 died prematurely of side effects. Tumors developing in the survivors included hepatoma in 4/9 (2/4 also developed kidney carcinomas), 1 brain sarcoma and 5 benign tumors (1 mammary fibroadenoma, 1 benign hepatoma, 3 renal adenomas) after latent periods of 95-183 days (4/9), 359-389 days (4/9) or 711 days (1/9, with 2 benign tumors). Offspring of the DENA-treated females showed an increased mortality rate (up to 55%) in the first few mo. of life, but none of these animals showed malignant tumors. No fetal abnormalities were seen in any of the offspring. Of the 40 offspring surviving 1 yr. or more, 18 developed malignant tumors (most frequently mammary fibroadenoma and/or thymoma, 7/18 each, or thyroid carcinoma, 3/18), 2/40 developed hepatic reticulosis and 21/40 developed no tumors. Latent periods were prolonged (438-789 days). It is concluded that DENA has little transplacental carcinogenic effect.

69-738 ESOPHAGEAL CARCINOMA FOLLOWING INHALATION OF METHYLBUTYLNITROSAMINE (MBNA) IN RATS. (Ger.) Druckrey, H. (Max Planck Inst. Immunobiol., Freiburg i. Br., Germany), Ch. Landschütz and R. Preussmann. Z. Krebsforsch. 71(2):135-139, 1968.

Two groups of BD rats from non-homogeneous strains were treated with methylbutylnitrosamine by inhalation (1 dose/wk.; 75 ppm for 1 hr. x 23 wk., total 207 mg/kg, 11 rats; or 25 ppm, total 69 mg/kg, same regimen, 15 rats). The acute LD_{50} by inhalation was 90 mg/kg. Only 4/11 in the first group survived treatment long enough to permit tumor induction; 4/4 died of infiltrating basal cell carcinoma of the esophagus after latent periods of 177-250 days (mean 245 days). In the second group, 7/15 survived treatment long enough to permit tumor induction; 6/7 died of the same type of esophageal tumor (3/6 also showed invasion of the pharynx and the root of the tongue) after latent periods of 219-285 days (mean 230 days) and 1/7 died of a glandular carcinoma of the pancreas with extensive pulmonary metastases on day 154. All other animals in both groups showed extensive hyperkeratosis and multiple papillomas of the esophagus, presumed to be premalignant in the animals which died prematurely of pneumonia.

69-739 BIOCHEMICAL MECHANISM OF SKIN CARCINOGENESIS IN MICE. I. METABOLISM AND DISTRIBUTION OF INTRAGASTRICALLY APPLIED 9,10-DIMETHYL-(1,2)-BENZANTHRACENE IN THE MOUSE. (Ger.) Hecker, E. (Max Planck Inst. Biochem. Munich, Germany) and D. Paul. Z. Krebsforsch. 71(2):153-166, 1968.

Skin tumors were induced in NMRI mice (both sexes, wk. old at the start of the experiment) by single intragastric doses of 9,10-dimethylbenzanthracene (DMBA; 10.0 µmoles in polyethylene glycol-400 and dimethylformamide, 24:1), followed by topical application of 12-O-tetradecanoylphorbol-13-acetate (TPA; 2 doses/wk. of 0.02 µmoles x 36 wk.). DMBA alone induced tumors in 20-40 wk.; TPA alone in approx. 36 wk.; DMBA + TPA in 7-12 wk. Histologically, tumors consisted primarily of benign papillomas, with occasional carcinomas. No acute side effects were seen. After admin. of DMBA-^{3}H, liver radioactivity peaked at 5% of the total dose hr. after DMBA admin., declined to approx. 3.8% at 16 hr., rose to approx. 4.0% at 24 hr., then declined progressively to approx. 1.0% at 48 hr., remaining at that level throughout the remainder of a 72-hr. observation period. An essentially similar pattern was seen in the kidneys, with peaks at approx. 1.5% and 1.0% of the total dose, resp., falling to less than 0.5% by 48 hr. Radioactivity in the skin showed only 1 peak at 16 hr. (approx. .8% of the total dose), declined progressively to approx. 0.8% at 24 hr. and remained constant thereafter. Urinary and fecal DMBA excretion patterns paralleled closely the curve for total radioactivity in the liver, kidney and skin; 93% of the total activity admin. was excreted within 72 hr. Studies of liver homogenates from treated animals confirmed a sharp increase of metabolic enzyme activity following intragastric admin. of DMBA; this effect was readily and almost entirely inhibited by i.p. admin. of either actinomycin D or puromycin. Further metabolic studies suggested that DMBA induced the biosynthesis of catabolic enzymes.

69-740 CARCINOMA OF THE LIVER AND URINARY BLADDER IN GUINEA PIGS INDUCED BY DI-n-BUTYLNITROSAMINE. (Ger.) Ivankovic, S. (Max Planck Inst. Immunobiol., Freiburg i. Br., Germany) and J. Bucheler. Z. Krebsforsch. 71(2):183-185, 968.

Dibutylnitrosamine (40 mg/kg/day, 5 doses/wk. p.o. in drinking water until death or experimental day 880) was admin. to 19 young guinea pigs of a mixed strain; 4/19 died of pneumonia too soon to permit tumor induction. All 15 animals surviving long enough for tumor induction died of liver tumors, 7/15 before and 8/15 after the end of treatment. Hepatocellular carcinoma was confirmed histologically in 13/15 (in 5/13, accompanied by malignant cholangioma), malignant cholangioma alone in 1/15 and cystadenocarcinoma of the bile ducts in 1/15. Multiple metastases to the spleen and lung were seen in 3/15 and 1/15, resp. Papillomas and hyperkeratosis of the bladder were seen in 3/15 and carcinomas of the bladder in 4/15. The estimated mean tumor induction time was approx. 840 ± 180 days.

69-741 CANCER OF THE STOMACH AND PANCREAS IN GUINEA PIGS INDUCED BY METHYLNITROSOUREA AND -URETHAN. (Ger.) Druckrey, H. (Max Planck Inst. Immunobiol., Freiburg i. Br., Germany), S. Ivankovic, J. Bücheler, R. Preussmann and C. Thomas. Z. Krebsforsch. 71(2):167-182, 1968.

Methylnitrosourea (2.5 mg/kg/day, 5 doses/wk. p.o. in drinking water) was admin. to 35 guinea pigs of various strains, beginning at age 130 days and continuing until death. Treatment was tolerated poorly and had to be interrupted periodically. Deaths due to malignant tumors were seen in 12/26 animals surviving long enough to permit tumor induction (474-1045 days); the estimated mean tumor induction time was approx. 800 ± 200 days (mean cumulative dose 0.8 g/kg). The tumors included leukemia (2), carcinoma or sarcoma of the stomach (5), adenocarcinoma of the pancreas (2; 1/2 with multiple metastases), carcinoma or sarcoma of the auditory canal (1 each) and retroperitoneal neurinoma (1). When methylnitrosourethan (3 mg/kg/wk. s.c., until death or a total dose of 0.13 g/kg) was admin. to 5 guinea pigs, 2/2 surviving long enough to permit tumor induction developed fibrosarcomas at the inj. site, 11-16 mo. after the end of treatment. When the same compound was admin. to 47 young guinea pigs (2.5 mg/kg/day, 5 doses/wk. p.o. in drinking water until death), 9/47 died of pneumonia too soon to permit tumor induction (6/9 with gastric ulcers which appeared to be precancerous). A total of 25/38 survivors developed carcinoma of the stomach (13/25) or pancreas (14/25; 2/14 also showed stomach carcinoma), alveolar cell carcinoma (1), basal cell carcinoma of the larynx (1) and sarcoma of an unspecified site with pulmonary metastases (1). The estimated mean tumor induction time was approx. 740 ± 170 days; the mean cumulative dose was approx. 70% the total suggested by the elapsed time, because of interruptions of treatment due to intolerance.

69-742 STUDY OF THE BIOLOGICAL ACTION OF BENZO(a)PYRENE. I. ACTION OF U.V. IRRADIATION AND SOME CHEMICAL AGENTS ON THE INDUCTION OF HEPATIC HYDROXYLASES BY BENZO(a)PYRENE. (Fr.) Rondia, D. (U. Liege, Belgium) and P. Delwaide. Biochem. Pharmacol. 17(10):2171-2177, 1968.

In young male albino rats (about 75 g) admin. 3,4-benzpyrene (BP; 1 dose i.p. in tricaprylin), the induction of hepatic hydroxylase activity varied according to the dose of BP. From 0.01-2.5 mg/kg of BP, the activity rose very rapidly, and then more slowly up to a dose of 70 mg/kg. Irradiation of the admin. BP and the simultaneous admin. of different substances (benzpyrenequinone, anthracene, vitamin A and aminocaproic acid) with BP, did not affect the enzymatic response to BP. UV irradiation of BP acted only by destroying a certain amount of the hydrocarbon; the resulting phenols and quinones had no detectable effect.

69-743 EFFECTS OF AFLATOXIN B_1 AND OTHER CARCINOGENS UPON NUCLEOLAR RNA OF VARIOUS TISSUES IN THE RAT. (E.) Floyd, L. R. (Baylor U. Coll. Med., Houston, Tex.), T. Unuma and H. Busch. Exp. Cell Res. 51(2/3):423-438, 1968.

Nucleolar RNA was studied in intact or partially hepatectomized male albino rats (regeneration was allowed to proceed 18 hr. before sacrifice) and in rats bearing 6-8-day-old transplanted Novikoff ascites hepatoma. Aflatoxin B_1 (AB; 50-200 μg/kg i.p.) inhibited the synthesis of 35S, 45S and 55S nucleolar RNA in normal rat liver; at 200 μg/kg it completely inhibited the synthesis of 45S RNA. AB (500 μg/kg) induced segregation of the granular and fibrillar components of normal rat liver; the nucleoli were smaller, rounded and more compact than in controls. Changes in nucleoli of animals admin. 50 μg/kg of AB were minimal; only segregation of the granular and fibrillar components was observed in animals admin. 150 μg/kg. The base compositions of the 28S, 35S, 45S and 55S nucleolar RNA fractions in animals admin. 50 μg/kg of AB remained unchanged. In regenerating liver, 64% inhibition of 45S and 55S RNA synthesis and 53% decrease in peak radioactivity were seen 18 hr. after inj. of 3'-methyl-4-dimethylaminoazobenzene (100 mg/kg i.p.). The nucleoli were small, rounded and more compact than in controls and the fibrillar and granular components were segregated. No significant changes in RNA base composition were noted. A 32% decrease in 45S and 55S RNA and a 64% decrease in peak radioactivity were observed 1 hr. after 4-nitroquinoline-N-oxide (NAO; 0.5 mg/rat i.p.) admin. to rats with Novikoff ascites hepatoma; the base composition of 45S and 55S RNA was unchanged. However, no 35S 45S or 55S RNA patterns were observed 1 hr. after admin. of a higher dose of NQO (5 mg/rat). Changes in NQO-treated nucleoli of Novikoff hepatoma cells after 24 hr. were similar to those seen in AB-treated cells. Only minimal alterations were seen 1 hr. after admin. of NQO at 0.5 mg.

69-744 ALTERATION OF THE METABOLISM OF THE CARCINOGEN N-2-FLUORENYLACETAMIDE BY ACETANILIDE. (E.) Grantham, P. H. (NCI, Bethesda, Md.), L. Mohan, R. S. Yamamoto, E. K. Weisburger and J. H. Weisburger. Toxic. Appl. Pharmacol. 13(1):118-130, 1968.

In vitro experiments showed that nitrosobenzene inhibited the binding of 2-nitrosoflurorene to serum albumin, but chloramphenicol did not. Single doses of acetanilide (AA; 250 and 500 μM i.p.), admin. 2 hr. prior to the inj. of ^{14}C-labeled N-2-fluorenylacetamide (NFAA; 10.4 μM), did not significantly affect urinary and tissue NFAA metabolites in male Fischer rats, by comparison to controls admin. NFAA alone. Differences in urinary and tissue NFAA metabolites were seen in 4 groups of male Fischer rats: untreated controls or rats pretreated for 6 wk. by dietary admin. of NFAA alone (0.02%), NFAA (0.02%) + AA (0.8%) or AA alone (0.8%), followed by inj. of labeled NFAA. Measurement of liver and plasma radioactivity and isotope binding to liver proteins and the subcellular liver fractions showed the lowest binding in rats pretreated with unlabeled NFAA. Rats fed AA alone or + NFAA showed a similar decrease in binding (65-70% of control values). Radioactivity was also firmly bound to DNA in the same relative pattern in the 4 groups. Animals pretreated with NFAA excreted more radioactivity from the labeled NFAA than the controls. Excretion of the glucosiduronic fraction was increased after NFAA pretreatment; the active carcinogenic intermediate N-hydroxy-N-2-fluorenylacetamide (as the glucuronide) amounted to 4.3% of the dose, compared to 0.21% in controls. Pretreatment with AA alone or + NFAA gave a pattern of urinary metabolites similar to controls.

69-745 INHIBITION OF THE TOXICITY AND CARCINOGENICITY OF N-2-FLUORENYLACETAMIDE BY ACETANILIDE. (E.) Yamamoto, R. S. (NCI, Bethesda, Md.), R. M. Glass, H. H. Frankel, E. K. Weisburger and J. H. Weisburger. Toxic. Appl. Pharmacol. 13(1):108-117, 1968.

A large molar excess of acetanilide (AA) inhibited the toxicity and prevented or delayed carcinogenesis from N-2-fluorenylacetamide (NFAA) in young male Fischer rats. Dietary admin. of 0.03% NFAA was lethal to the rats within 4-5 wk.; at 0.025%, the survival time was slightly longer but most animals died within 6 wk. An 0.02% NFAA diet for 16 wk., followed by a control diet for 10 wk., was tolerated and induced hepatomas and cirrhosis of the liver in nearly all animals. Addition of 0.8% AA to the NFAA diet permitted survival of rats admin. 0.03%, 0.025% and 0.02% NFAA. This dose of AA also completely prevented the carcinogenic effects of the lowest NFAA dose in 26-wk. tests; the animals showed only mild fibrosis of the liver. Diets containing 0.025% NFAA + 0.8% AA induced no hepatomas and the incidence of hepatic hyperplasia was low; with 0.4% AA, most animals at risk developed hyperplasia but no hepatomas were seen.

69-746 CARCINOGENIC ACTION OF GROUNDNUT MEAL CONTAINING AFLATOXIN IN RATS. (E.) Butler, W. H. (Med. Res. Council Labs., Carshalton, Surrey, England) and J. M. Barnes. Food Cosmet. Toxic. 6(2):135-141, 1968.

In male and female Porton strain white rats (40-50 days old) fed for 1-9 wk. with peanut meal diets containing 5 ppm of aflatoxin B_1 (AB; no aflatoxin G_1, G_2 or M was found in naturally contaminated peanut meal, but 0.2 ppm of aflatoxin B_2 was found), the hepatocarcinoma incidence in survivors rose from 0/13 at the lowest dose (calculated total 0.63 mg of AB) to 6/6 at the highest dose (calculated total 5.7 mg). In rats fed 0.5 or 0.1 ppm of AB for life, the incidence of liver tumors in males was 100% and 50%, resp;

he incidence was somewhat less in females. A otal AB dose of about 3 mg or over caused liver umors in 100%, whether the treatment lasted 9 k. or 50-80 wk. Other tumors apparently induced y AB were observed in the stomach, lung, sali- ary glands, mesenchymal tissue, brain, skin, ituitary, adrenal cortex, mammary gland, uterus nd kidneys (adenocarcinomas or carcinomas of the enal pelvis, not the Wilms' tumor type); the lym- homa incidence was about the same in both groups.

9-747 MICROSOMAL N-DEMETHYLASE ACTIVITY IN DEVELOPING RAT LIVER AFTER ADMINISTRA- ION OF 3-METHYLCHOLANTHRENE. (E.) Bresnick, E. Baylor U. Coll. Med., Houston, Tex.) and J. G. tevenson. Biochem. Pharmacol. 17(9):1815-1822, 968.

heek-Jones male and female rats, including preg- ant, preweanling, newborn, weanling (male) and etal animals (16-18 days of gestation), were dmin. 3-methylcholanthrene (MC; 1 mg/50 g body t. in 0.5 ml corn oil, i.p. or directly into the mniotic sac). An increase in liver microsomal -demethylase activity was seen in adult female, eonatal, preweanling and weanling rats. Enzyme ctivity could not be induced in fetal liver fter MC admin. to the pregnant rat or direct inj. nto the amniotic sac. Inj. of ^{14}C-labeled MC n pregnant rats established the transport of MC nto the fetal liver circulation. It is concluded hat an aspect of maternal environment prevented he elaboration of the drug-metabolizing enzymes fter MC admin.

9-748 EFFECT OF PARTIAL HEPATECTOMY ON THE RESPONSIVENESS OF MICROSOMAL ENZYMES ND CYTOCHROME P-450 TO PHENOBARBITAL OR 3-METHYL- HOLANTHRENE. (E.) Gram, T. E. (NIH, Bethesda, d.), A. M. Guarino, F. E. Greene, P. L. Gigon nd J. R. Gillette. Biochem. Pharmacol. 17(9): 769-1778, 1968.

ntact, sham-operated or partially hepatectomized ale Sprague-Dawley rats were treated i.p. with aCl (0.5 ml of 0.9% soln./100 g/day x 4, beginn- ng 2 or 10 days after surgery), phenobarbital odium (P; 80 mg/kg/day x 4, as above; last dose 4 hr. before sacrifice) or 3-methylcholanthrene MC; 40 mg/kg in corn oil, 1 dose 36 hr. before acrifice). P and MC caused significant in- reases in liver wt. in intact, sham-operated and artially hepatectomized animals, but MC failed o increase liver wt. in partially hepatectomized ats when admin. early in the regenerative pro- ess (6 days after surgery). P significantly ncreased microsomal protein in all 3 groups. C admin. did not significantly alter microsomal rotein content, except in 14-day hepatectomized ats. Cytochrome P-450 was significantly in- reased by admin. of P or MC in all 3 groups. The ncrease of cytochrome P-450 was lower on day 6 n sham-operated and hepatectomized rats than in ntact controls. Treatment of control or operated rats with P or MC significantly enhanced the O-demethylation of p-nitroanisole by hepatic microsomes. P admin. enhanced the hexobarbital hydroxylase activity of hepatic microsomal protein in all 3 groups, while MC had no significant effect. P admin. significantly enhanced microsomal aniline hydroxylase on day 6 in all 3 groups. MC admin. did not stimulate aniline hydroxylase activity in intact or sham-operated animals, but caused significant stimulation in hepatectomized animals. It is concluded that regenerating liver can respond to enzyme induction by P or MC, although its microsomal enzyme levels are low.

69-749 QUANTITATIVE ASPECTS OF THE METABOLISM OF 7,12-DIMETHYLBENZ(a)ANTHRACENE BY LIVER HOMOGENATES FROM ANIMALS OF DIFFERENT AGE, SEX AND SPECIES. (E.) Sims, P. (Royal Cancer Hosp., London) and P. L. Grover. Biochem. Pharmacol. 17(9):1751-1758, 1968.

Livers from Chester-Beatty strain rats and C strain mice (access to solid food from birth and fully weaned by 21 and 25 days, resp.) and adult guinea pigs and hamsters were homogenized and incubated with tritiated 7,12-dimethylbenzanthracene (DMBA; 400 mC/mM; 3.83 x 10^6 cpm, 0.1 ml). Estimation of the known end products of DMBA metabolism showed transient increases in hepatic enzyme activities in rats and mice in the post-weaning period, probably from dietary components first ingested at weaning. Differences in hepatic DMBA metabolism did not seem to account for the inability of DMBA to cause adrenal necrosis in adult mice, hamsters and guinea pigs. Little sex difference was apparent in the metabolic patterns of DMBA in mouse liver homogenates. A high rate of DMBA metabolism was found in younger animals.

69-750 A POSSIBLE ROLE OF TRANSFER RNA IN THE MECHANISM OF CARCINOGENESIS. (E.) Weinstein, I. B. (Columbia U. Coll Phys. Surg., New York, N. Y.). Cancer Res. 28(9):1871-1874, 1968.

When normal rat liver was charged with arginine, isoleucine, valine, lysine, phenylalanine and leucine, fractionation by methylated albumin column chromatography showed 2, 1, 3, 2, 1 and 3 components, resp., probably representing a minimum estimate of individual types of transfer RNA (tRNA), due to limited resolution of the column. Rats were maintained on an ethionine diet for 1 mo., then inj. with ethyl-^{14}C-labeled ethionine for 4 days prior to sacrifice, and the extracted, labeled liver tRNA was analyzed by cochromatography with a 6-fold excess (on an A_{260} basis) of tRNA from normal rat liver. In contrast to the sharp peaks obtained with tRNA's specific for individual amino acids in normal rat liver, the profile of the ethyl-labeled tRNA showed a broad peak which was similar in contour to the A260 profile of tRNA from normal liver, confirming ethylation of many species of tRNA. Over an RNA conc. range of 0.2-0.5 mg/ml, the leucine and valine acceptance capacities of ethylated and normal tRNA were essentially equivalent. When ethylated and normal tRNA were charged with radioactive valine, the elution profiles were identical; when they were charged with leucine in the Nirenberg-Leder ribosomal assay, ethylated tRNA responded only to poly UC and normal tRNA to both poly UC and poly UG, suggesting that the ethylated substance was deficient in a species of leucyl-tRNA which normally recognizes the UUG codon. Chromatography also indicated at least 3 leucine components in normal tRNA, while ethylated tRNA showed only 1 of them. It is concluded that alterations of tRNA may play a considerable role in the initiation of hepatoma by ethionine (and possibly by other carcinogens), while subsequent maintenance of the neoplastic state could result from secondary changes which persist even after the tRNA patterns have returned to normal.

69-751 EFFECTS OF ORGAN-SPECIFIC NITROSAMINES ON ENZYME INDUCTION AND NUCLEIC ACID METABOLISM. (Ger.) Kröger, H. (U. Freiburg im Breisgau, Germany) and H. Kessel. Z. Naturforsch. [B] 23(9):1240-1244, 1968.

The induction of hepatic tyrosine-α-ketoglutarate transaminase (TKGT; by L-tyrosine, 600 mg/kg i.p.) or tryptophan pyrrolase (TP; by cortisone acetate, 40 mg/kg i.p.) and RNA metabolism in the liver and other organs was studied in Sprague-Dawley rats (120-150 g) treated throughout life with diethylnitrosamine (DENA; 4 mg/kg/day), N-nitrososarcosine ethyl ester (NSEE; 80 mg/kg/day) or N-nitrosomorpholine (NM; 10 mg/kg/day) in the drinking water. NSEE, which induced squamous cell carcinoma of the esophagus, had little effect on either of the enzyme induction systems or on liver glycogen storage; orotate-^{14}C incorporation into liver RNA remained unchanged, but NSEE caused a slight increase in uridine-^{3}H incorporation into RNA in the esophagus, kidney, heart and spleen. The av. survival time in NSEE-treated rats was 176 days. DENA, a specific liver carcinogen (av. survival time was 181 days), significantly inhibited TKGT induction and orotate incorporation into liver RNA, but did not affect TP induction. Significant liver glycogen storage was seen in DENA-treated rats. NM, also a specific liver carcinogen (av. survival time was 218 days), had about the same effects on liver enzyme induction as DENA, but stimulated liver RNA orotate incorporation. It is concluded that liver enzyme induction is stimulated by only those nitrosamines which are specific liver carcinogens.

69-752 COMPARATIVE STUDIES OF THE LOSS OF GLUCOSE-6-PHOSPHATASE AND SEROLOGIC SPECIFICITY IN RAT LIVER CELLS DURING THE INITIAL STAGES OF CARCINOGENESIS. (Ger.) Börner, P. (Max Planck Inst. Virus Res., Tübingen, Germany). Z. Naturforsch. [B] 23(8):1082-1084, 1968.

Glucose-6-phosphate dehydrogenase (GPD) was studied histochemically and tissue-specific antigens (TSA) were studied by immunofluorescence in the livers of female Sprague-Dawley rats (150-170 g) treated for 6-12 wk. with diethylnitrosamine (DENA; 6 doses/wk. of 5 mg/kg p.o.). No significant changes were seen after 6 wk. of treatment (total 180 mg/kg). After 7 wk. of treatment (total 210 mg/kg), small centrolobular areas of GPD-free cells were noted, but some of these cells were TSA-positive and other areas lost TSA activity but retained GPD activity. After 8, 9 or 12 wk. of DENA admin. (total 240, 270 and 360 mg/kg, resp.), the number of foci with reduced GPD and/or TSA levels increased with the DENA dosage. About 80% of the liver cells examined lost both GPD and TSA; 2-4% lost TSA but retained GPD activity, while 10-20% of the GPD-free areas showed normal TSA levels. The TSA component was not identical to GPD; TSA could be extracted at pH 9.5 from the endoplasmic reticulum of the liver cells, but GPD was not obtained by this method.

69-753 ENZYME HISTOCHEMICAL STUDIES OF ADENOSINE TRIPHOSPHATASE, ALKALINE AND ACID PHOSPHATASE AND SUCCINATE DEHYDROGENASE IN THE RAT LIVER PARENCHYMA DURING TREATMENT WITH THE CARCINOGEN DIETHYLNITROSAMINE. (Ger.) Börner, P. (Max Planck Inst. Virus Res., Tübingen, Germany) and W. Gössner. Z. Naturforsch. [B] 23(8): 1085-1091, 1968.

Liver enzymes were studied histochemically in Sprague-Dawley rats after 4-20 wk. of treatment with diethylnitrosamine (DENA; 6 doses/wk. of 5 mg/kg p.o.). The first change noted was a decrease in ATPase activity in the biliary capillaries after 7 wk. Mitochondrial changes and a reduction of mitochondrial succinate dehydrogenase appeared only in the later stages of carcinogenesis (16 wk.), as did the appearance of alkaline phosphatase activity in the cell walls. The peribiliary arrangement of the lysosomes was disrupted and their acid phosphatase levels were reduced after 7 wk.; the enzyme was dispersed irregularly throughout the cytoplasm of the tumor cells after 16 wk. Unlike the changes seen in the endoplasmic reticulum, none of these effects was specific for DENA or even for the beginning stages of carcinogenesis; these changes are also seen (singly or in various combinations) after admin. of non-carcinogenic or carcinogenic liver toxins, or in association with bacterial or virus infections.

69-754 FINE STRUCTURE OF PRIMARY RAT HEPATOMA INDUCED BY 2-ACETYLAMINOFLUORENE FEEDING. (E.) Flaks, B. (Sch. Med., Leeds, England). Europ. J. Cancer 4(5):513-521, 1968.

eeds strain male rats (200 g) were fed 2-acetylminofluorene (AAF; 0.05% by wt. in diet) for 10 o., followed by a carcinogen-free diet for 2-8 o. before sacrifice. All AAF-induced liver umors were hepatomas or hepatocarcinomas, which rogressed in number and anaplasia with time. he hepatomas were classified as Stage A (well-ifferentiated, non-invasive and cystic), Stage B more anaplastic and invasive) and Stage C (highly naplastic). Tumor ultrastructure was compared o that of AAF-induced premalignant lesions (PML; reviously reported). Microbodies, glycogen and granular endoplasmic reticulum were normal hrough Stage B, then disappeared. Lysosomes ecreased in number after Stage A (autophagic acuoles were seen in PML and Stage A). Abnoralities of the granular endoplasmic reticulum reduced quantities, abnormalities of the cisernae) and the cell surface (separation of the ells, increased desmosomes, dilated bile canaliuli) were seen at all stages including PML, inreasing with increased anaplasia. Mitochondria ere small but their numbers were normal until tage C, when fewer mitochondria were seen. uclear abnormalities in Stages A and B included embrane blebbing and lipid inclusions, resp.; tage C cells showed nuclei of variable shape ith a variety of inclusions. Nucleoli were ypertrophic through Stage B and variable in tage C.

-755 SULFOTRANSFERASE ACTIVATION OF N-HYDROXY-2-ACETYLAMINOFLUORENE IN RODENT LIVERS USCEPTIBLE AND RESISTANT TO THIS CARCINOGEN. E.) DeBaun, J. R. (U. Wisconsin Med. Ctr., adison), J. Y. Rowley, E. C. Miller and J. A. iller. Proc. Soc. Exp. Biol. Med. 129(1): 68-273, 1968.

upernatant fractions of liver (0.7 ml) were ncubated with N-hydroxy-2-acetylaminofluorene HAAF; 1 mg/2 ml final vol.) in a system containng L-methionine (7 mg). HAAF activation was tudied by the enzymatic (sulfotransferase) foration of acetylaminofluorene (AAF)-N-sulfate rom HAAF and added or enzymatically generated '-phosphoadenosine-5'-phosphosulfate (PAPS; .0003 or 0.001 M). Soluble fractions from emale rat liver (Holtzman) synthesized only bout 20% as much AAF-N-sulfate as fractions rom male rat liver. Studies of liver fractions rom the female rats and adult male albino mice CD-1), guinea pigs and Syrian golden hamsters howed that the ability of the liver supernatant ractions to transfer sulfate from PAPS to HAAF aralleled the susceptibility of these animals o liver carcinogenesis by HAAF. An exception as seen in preparations from the livers of dult male New Zealand rabbits, which showed igh sulfotransferase levels although rabbits re resistant to HAAF carcinogenesis (HAAF may e removed from rabbit liver by reduction).

9-756 CHEMICAL CARCINOGENESIS: PERSISTENCE OF BOUND FORMS OF 2-FLUORENYLACETAMIDE. (E.) Epstein, S. M. (U. Pittsburgh Sch. Med, Pa.), J. McNary, B. Bartus and E. Farber. Science 162(3856):907-908, 1968.

Binding of metabolites of 2-fluorenylacetamide (2-FAA) to liver glycogen and DNA was studied in male white Wistar rats (150-200 g) fed 2-FAA (doses not stated) under conditions inducing hyperplastic nodules (HN) or hepatocellular carcinoma. Some rats were fed a normal diet for 4 wk.-6 mo. after 2-FAA was stopped. The principal metabolite of 2-FAA in the glycogen and DNA of tumor or HN tissue (but not in the surrounding normal tissue) was identified by chromatography and spectrophotometry as N-acetoxy-2-FAA. This bound metabolite persisted in the cells throughout the experiment, even in the livers of rats fed the basal diet for 6 mo. after the end of 2-FAA admin. DNA from HN cells differed from DNA of control liver or the surrounding nonmalignant tissue by the presence of excessive branching and frequent strand separation under the electron microscope. It is suggested that the persistence of a carcinogen bound to macromolecules (glycogen and DNA in this case) may be a prerequisite for carcinogenesis by some compounds. Molecular evidence for the lineage between the original liver cells and the tumor cells, with HN as an intermediate, was provided by the persistence of the 2-FAA metabolite in the premalignant and malignant cells only. The absence of repair mechanisms as an essential step in carcinogenesis was suggested by the persistence of bound 2-FAA metabolites in the altered cells and its disappearance from normal cells.

69-757 ISOLATION OF MEMBRANE-ASSOCIATED TUMOUR-SPECIFIC ANTIGENS FROM RAT HEPATOMAS INDUCED BY AMINOAZO DYE. (E.) Baldwin, R. W. (U. Nottingham, England) and M. Moore. Nature (London) 220(5164):287-289, 1968.

Rat hepatoma D23 (induced by 4-dimethylaminoazobenzene) transplanted in syngeneic Wistar rats was used for the isolation of membrane fractions. The antigenicity of tumor cell membrane fractions was assayed by their capacity to absorb antibody from isoimmune or tumor-specific immune sera (prepared by immunizing Wistar rats with irradiated D23 isografts and by inoc. of this tumor into Slonaker strain rats, resp.). Anti-hepatoma D23 iosantisera from Slonaker strain rats gave strong immunofluorescence staining of hepatoma D23 cells (fluorescence indices approaching 1.0). Immunofluorescence staining of hepatoma D23 cells with tumor-specific antisera was much less intense than that observed with isoantisera (fluorescence indices of 0.3-0.6). Pre-absorption of antisera with conc. soluble cytoplasmic protein did not neutralize the tumor-specific antibody. It is concluded that removal of antibody following treatment with hepatoma D23 cells or membrane is not due to non-specific absorption.

69-758 DELAYED HYPERSENSITIVITY AND TRANSPLANTATION IMMUNITY ELICITED BY SOLUBLE ANTIGENS OF CHEMICALLY INDUCED TUMOURS IN INBRED GUINEA-PIGS. (E.) Oettgen, H. F. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.), L. J. Old, E. P. McLean and E. A. Carswell. Nature (London) 220(5164):295-297, 1968.

In inbred female guinea pigs (strain 13; 1-4 wk. old), s.c. inj. of 3-methylcholanthrene (5 mg) or 7,12-dimethylbenzanthracene (20 mg) induced tumors in 43/91 and 3/4 animals, resp., after 2.5-20 mo. Most tumors were fibrosarcomas, but several contained other mesenchymal components. These tumors were maintained in serial passage in the same strain of guinea pigs by bilateral s.c. implantation (by trocar). Guinea pigs initially immunized with s.c. tumor transplants (approx. 5 mg) that were too small to grow progressively, later proved resistant to larger grafts of the same tumor and could reject up to 6 g of tumor tissue (approx. 100 times the amount necessary to initiate a successful transplant) after a series of inocula of increasing size. In animals immunized with 2 or 3 successive tumor grafts, skin reactions of the delayed type could be elicited by intradermal inj. of saline extract of a tumor of the same antigenic type. Soluble products of chemically induced tumors elicited delayed hypersensitivity and induced transplantation immunity to isogeneic grafts. No cross-reactions were seen among 16 induced tumors. It is suggested that detection of tumor antigens by delayed hypersensitivity offers a new approach to determine the extent of unique antigenicity among different tumors.

69-759 INDUCTION OF MAMMARY CANCER IN RATS WITH CYCASIN: A PRELIMINARY REPORT. (E.) Kawaji, K. (Kagoshima U. Sch. Med., Japan), R. Fukunishi, S. Terashi, J. Higashi and K. Watanabe. Gann 59(4):361, 1968.

In female Sprague-Dawley rats (120 days old), admin. of cycasin (4 mg/kg/day p.o.) induced mammary adenocarcinoma in 2/10 rats after 146 or 239 days (1/2 also showed lung metastases at autopsy). The other 8/10 were without malignant tumors after 12 mo. of observation. In the author's colony of Sprague-Dawley rats, no malignant mammary tumors and only 2 mammary fibroadenomas were seen in 46 females after 1 yr. of observation. It is suggested that cycasin accelerates mammary tumor development.

69-760 CHEMICAL INDUCTION OF MAMMARY CANCER IN PSEUDOPREGNANT MICE OF STRAIN STRONG A. (E.) Karande, K. A. (Indian Cancer Res. Ctr., Parel, Bombay, India), P. B. Mistry and S. R. S. Rangan. Indian J. Exp. Biol. 6(2):70-74, 1968.

Attempts were made to induce pseudopregnancy in 2-3-mo.-old Strong A mice by tubal ligation and mating with intact males (Groups I and II; 11 and 18 mice, resp.), mating with vasectomized males (Group III; 12 mice) or overcrowding (Groups IV and V; 12 and 10 mice, resp.). Mice of Groups II and V were also painted until death with 3-methylcholanthrene (MC; 2 doses/wk. of 0.25% soln. in thiophene-free benzene). Repeated pseudopregnancies were seen only in 2/11 of Group I, which were also the only mice to develop mammary adenocarcinomas (age about 20 mo.). No mammary tumors developed in any of the MC-treated mice. Occasional pseudopregnant cycles were seen in 9/11 of Group I, 3/18 of Group II and 4/12 of Group III; some mice in Groups IV and V showed long diestrus periods without true pseudopregnancy. The incidence of premalignant hyperplastic mammary nodules was 5/11 in Group I, 10/18 in Group II, 1/12 each in Groups III and IV, 0/10 in Group V and 0/6 in uncrowded, intact controls; therefore, the development of premalignant nodules was related more to the development of pseudopregnancy than to treatment with MC.

69-761 INFLUENCE OF VARIOUS HORMONES ON THE GROWTH OF THE YOSHIDA SARCOMA IN RATS. PART I. THE EFFECT OF REMOVAL OF SEVERAL ENDOCRINE ORGANS. (Jap.) Harada, H. (Tokyo Med. Coll., Japan). Tokyo Ika Daigaku Zasshi (J. Tokyo Med. Coll.) 25(5):505-509, 1968.

In intact or sham-operated rats bearing Yoshida sarcoma, the av. survival time was 8.1 days after tumor inoc. Hypophysectomy and adrenalectomy stimulated tumor growth and reduced the av. survival time to 4.9 and 4.5 days, resp.; treatment with cortisone (5 mg/100 g) suppressed these responses and increased the av. survival times to 9.0 and 8.2 days, resp. Orchiectomy stimulated the tumor and reduced the survival time, but treatment with testosterone propionate (2 mg/100 g) partially blocked this response; av. survival times were 5.9 and 7.5 days, resp. Oophorectomy inhibited tumor growth and prolonged the survival time (av. 9.4 days). Thymectomy had no significant effect on tumor growth or the survival time (av. 8.0 days).

69-762 INFLUENCE OF VARIOUS HORMONES ON THE GROWTH OF THE YOSHIDA SARCOMA IN RATS. PART II. EFFECT OF SEVERAL HORMONAL DRUGS ON DEVELOPMENT OF THE YOSHIDA SARCOMA. (Jap.) Harada, H. (Tokyo Med. Coll., Japan). Tokyo Ika Daigaku Zasshi (J. Tokyo Med. Coll.) 25(5): 511-517, 1968.

The effects of hormonal pretreatment (beginning 7 days before tumor inoc.), simultaneous treatment or delayed treatment (beginning 3 days after tumor inoc.) on the Yoshida sarcoma were studied in rats. Tumor growth was enhanced by pretreatment with cortisone (5 mg/100 g/day), betamethasone (0.2 mg/100 g/day) or prednisolone (2 mg/100 g/day); the av. survival times were 7.7, 6.9 and 9.4 days, resp., compared to 8.1

ays in untreated controls. Survival times were educed by other hormones (estradiol benzoate in 11 regimens, testosterone propionate in 1 regi- en), but tumor growth was not stimulated.

9-763 THE NON-CARCINOGENICITY OF A SINGLE DOSE OF 4-AMINOBIPHENYL IN THE DOG. E.) Deichmann, W. B. (U. Miami, Coral Gables, la.) and W. E. MacDonald. *Food Cosmet. Toxic.* (2):143-146, 1968.

o signs of hematuria, premalignant lesions in he bladder mucosa or tumors of the urinary ladder were observed after 5 yr. of observation n 4/6 purebred beagles (all females) admin. 4-minobiphenyl (50 mg/kg p.o., single dose); the ther 2/6 (both males) died 18 hr. after admin. smaller dose (15 mg/kg p.o., single dose) was lso non-carcinogenic after 5 yr. in 2 other emale beagles. A 2-wk. acute toxicity study in ongrel dogs (6 males, 6 females) demonstrated he same side effects and about the same mortality ates at all p.o. doses from 0.28-2.1 g/kg, ossibly because of the combined effects of local .i. toxicity and the resulting incomplete bsorption of the agent.

9-764 ORAL TOXICITY OF LINURON (3-(3,4-DICHLOROPHENYL)-1-METHOXY-1-METHYLUREA) N RATS AND DOGS. (E.) Hodge, H. C. (U. Roches-er, N. Y.), W. L. Downs, D. W. Smith and E. A. aynard. *Food Cosmet. Toxic.* 6(2):171-183, 1968.

he approx. acute p.o. lethal dose of the herbi-ide Linuron (L) in male albino rats was 1.0-2.25 /kg for pure L and 7.5 g/kg for the commercial reparation (a 50% wettable powder; "Lorox"). In everal chronic feeding studies in rats and dogs, igh doses of L caused growth depression, anemia, ncreased erythrogenesis and abnormal blood pig-ents, but no tumors developed. L did not affect eproductive performance or post-weaning growth n rats and had no embryotoxic or teratogenic ffects in rabbits.

9-765 INDUCED MESENCHYMAL TUMORS OF THE RAT GENITAL TRACT. (E.) Castro, H. F. Baylor U. Coll. Med., Houston, Tex.), R. E. echner and H. J. Spjut. *Arch. Path. (Chicago)* 6(5):475-480, 1968.

n female Wistar rats (6-9 wk. old) treated with ,2'-dimethyl-4-aminobiphenyl (2 mg/100 g/day, 5 ays/wk., s.c. in peanut oil), the survival times ere 130-200 days in 46/169, 201-300 days in 4/169 and over 300 days in 39/169. Single or ultiple tumors developed in 125/169 (73%); the ost frequent tumors were mammary carcinomas 84/169), followed by transitional cell carcinoma r epithelial hyperplasia of the urinary bladder, arcoma of the salivary gland or sebaceous-quamous cell carcinoma of the ears (in decreas-ng order). Genital tumors developed in 42 animals (25%), 193-500 days after the beginning of treatment. The incidence of genital tumors was higher in rats treated only until the first tumors appeared (21/72 = 29%; total dose 136-203 mg) or admin. 5-day courses at 3-wk. intervals until death (18/43 = 42%; total dose 197-338 mg) than in rats admin. 5-day courses without interruption throughout life (3/54 = 6%; total dose 346-734 mg). The av. survival times were longer and tumors were identified later in animals admin. the smaller doses, but this may have been related to drug toxicity. The 20 benign genital tumors were identified as stromal hyperplasia of the ovary (1) or uterus (3), epithelial hyperplasia of the uterus (2) or stromal polyps of the vagina and cervix (14). The 22 malignant tumors were identified as leiomyosarcoma of the broad ligament (1) or uterus (6), stromal sarcoma of the vagina and cervix (6) or uterus (4), or unclassified sarcoma of the vagina and cervix (3) or uterus (2). Metastases were seen in 2/22. The distribution of tumor types was apparently not dose-related.

69-766 HORMONAL EFFECTS ON THE ENZYME ACTIVITIES OF THE PROSTATE OF RAT DURING 20-METHYLCHOLANTHRENE CARCINOGENESIS. (E.) Ishibe, T. (Hiroshima U. Sch. Med., Japan), M. Fukushige, I. Takenaka, M. Mizoguchi and M. Kazuta. *Endocr. Jap.* 15(2):181-187, 1968.

Male Wistar rats (70 g) were admin. 3-methylcholanthrene (MC; 0.1 ml of 3% Tween-80 soln.) by direct intraprostatic inj.; some rats were also treated with testosterone propionate (TP; 2 doses/wk. of 10 mg i.m.) or estradiol benzoate (EB; 2 doses/wk. of 0.5 mg i.m.), beginning immediately after MC admin. The 6-mo. survival rate was 17/30 with MC alone, 40/50 with MC + TP and 40/50 with MC + EB. The incidence of prostatic tumors in the 6-mo. survivors was 10/17 (58.9%) with MC alone (6 carcinomas, 2 papillomas, 1 adenoma, 1 sarcoma); it was about the same (24/40 = 60%) with MC + TP (15 carcinomas, 2 adenomas, 7 papillomas), and significantly increased (34/40 = 85%) with MC + EB (32 carcinomas, 2 sarcomas). In rats admin. MC alone or + TP or EB, the first prostatic tumors appeared after 90, 95 and 75 days, resp. Biochemical changes induced by MC, TP (6 doses/wk. of 0.05 mg) and EB (6 doses/wk. of 0.002 mg), were observed in the prostates of another group of rats (100-150 g). MC alone stimulated DNA metabolism (particularly the "tritium index") and reduced lactate dehydrogenase (LDH) levels. Both of these changes were even more marked in EB-treated animals. MC also reduced alkaline phosphatase, which was somewhat reduced by EB and not significantly affected by TP. LDH isoenzyme patterns in MC-treated rats included an increase in type M, some reduction of type H and no change in type III. EB caused a reduction in LDH isoenzyme type M and increases in types H and III. In TP-treated rats, LDH isoenzyme type M was normal or slightly increased, while type H was reduced.

69-767 LACK OF EFFECT OF 7,12-DIMETHYLBENZ(a)-ANTHRACENE ON THE PROLACTIN SECRETORY ACTIVITY OF ANTERIOR PITUITARY IN RAT. (E.) Nagasawa, H. (Nat. Cancer Ctr. Res. Inst., Tokyo), R. Yanai and K. Kuretani. Gann 59(4):357-359, 1968.

The short-term effects of a single dose of 7,12-dimethylbenzanthracene (DMBA; 20 mg in sesame oil p.o.) were studied in sexually mature female Sprague-Dawley rats (50-55 days old). The animals were sacrificed 3-10 days after DMBA admin. The only change in body or organ wt. was an increase in adrenal wt. after 3-5 days; adrenocortical necrosis and hemorrhage were also noted. Ovaries from some rats sacrificed after 3-5 days showed vacuolization of the lutein cells of the corpora lutea, but these changes were also seen in some untreated controls, and the histological changes usually seen in the ovaries were related to the stage of the estrus cycle. Electrophoretic analysis of the anterior pituitary hormones showed no change in the prolactin content in DMBA-treated rats. Mammary gland histology in treated rats was the same as in controls. These results suggest that DMBA has little stimulating effect on the prolactin-secreting activity of the anterior pituitary.

69-768 UROLOGICAL NEOPLASMS AND ENZYMES. IV. STUDIES ON THE ALTERATION OF LACTIC DEHYDROGENASE, ALKALINE PHOSPHATASE, LEUCINE AMINOPEPTIDASE, AND TOTAL ACID PHOSPHATASE ACTIVITIES AND LDH ISOZYMES IN RENAL TUMORS EXPERIMENTALLY INDUCED BY DIMETHYLNITROSAMINE. (Jap.) Ishibe, T. (Hiroshima U. Sch. Med., Japan). Hinyokika Kiyo (Acta Urol. Jap.). 14(6):307-312, 1968.

Enzyme metabolism was studied for up to 12 mo. in Wistar rats with kidney tumors induced by 2 wk. of dimethylnitrosamine feeding (500 ppm). No definite changes in serum or renal total acid phosphatase activities were noted. Leucine aminopeptidase activity increased in the serum and fell slightly in the kidney. Serum and renal alkaline phosphatase activities decreased slightly after 7-12 mo. During this time (7-12 mo.), significant increases in renal and serum lactate dehydrogenase (LDH) activity were also noted, with a shift in the LDH isoenzyme pattern (increased M type and fraction III and a decrease in H type).

69-769 UROLOGICAL NEOPLASMS AND ENZYMES. V. STUDIES ON THE ALTERATION OF LACTIC DEHYDROGENASE, ALKALINE PHOSPHATASE, LEUCINE AMINOPEPTIDASE, TOTAL ACID PHOSPHATASE ACTIVITIES AND LDH ISOZYMES IN RENAL TUMORS EXPERIMENTALLY INDUCED BY LEAD ACETATE. (Jap.) Ishibe, T. (Hiroshima U. Sch. Med., Japan). Hinyokika Kiyo (Acta Urol. Jap.). 14(6):313-318, 1968.

Enzyme metabolism was studied for up to 12 mo. in Wistar rats fed the CE-2 diet containing 10% lead acetate to induce kidney tumors. Alkaline phosphatase activity was significantly reduced in the kidneys and slightly reduced in the serum of treated rats. Renal leucine aminopeptidase was significantly reduced and renal total acid phosphatase was slightly increased in treated rats (by comparison to untreated controls), but no significant changes in the serum activities of either enzyme were noted. Total renal and serum lactate dehydrogenase (LDH) levels were about the same in treated and control rats, but LDH isoenzyme patterns were altered by the carcinogen. Kidney tissues of treated rats showed reduced levels of LDH type H and increased type M and fraction III, whereas serum levels of LDH type M and fraction III were reduced and type H was slightly increased.

See also abstract nos.: 675,679,680,681,690,694,780,859

VIRAL CARCINOGENESIS

Most abstracts in this section are supplied by the National Cancer Institute. Names of the abstractors are presented for each abstract. Unsigned abstracts have been prepared by Medical Literature, Inc.

69-770 OSTEOSARCOMAS APPEARING IN SYRIAN HAMSTERS AFTER TREATMENT WITH EXTRACTS OF HUMAN OSTEOSARCOMAS. (E.) Finkel, M. P. (Argonne Nat. Lab., Ill.), B. O. Biskis and C. Farrell. Proc. Nat. Acad. Sci. USA 60(4): 1223-1230, 1968.

Tissue extracts from 38 pts. with osteosarcoma were inj. into newborn Syrian hamsters; 6 of 461 unweaned hamsters inoc. with extracts from the first 7 pts., or with extracts from apparently normal hamsters previously inj. with the human tissue extracts, died with osteosarcomas. Since malignant bone tumors are rare in hamsters, this ncidence of 1.3% is noteworthy. Electron microscopic examination of the osteosarcomas showed particles resembling type C virus in thin sections of each tumor. Mouse leukemia virus-like particles were also found in thin sections of pelleted extracts of each of the human osteosarcomas. (A. O. Deeney)

9-771 HUMAN HERPESVIRUS INFECTION. (E.) Morecki, R. (Montefiore Hosp. Med. Ctr., Bronx, N. Y.) and N. H. Becker. Arch. Path. (Chicago) 153(3):292-296, 1968.

Human herpesvirus infections are of interest to the tumor virus field because they present a method for retrospective identification of human herpesviruses by identification of their fine tructure in formalin-fixed, paraffin-embedded tissue blocks, and because of the frequent ssociation of herpesviruses with certain malignant diseases. (I. Koprowska)

9-772 THE CIRCULATING LYMPHOCYTE - ITS ROLE IN INFECTIOUS MONONUCLEOSIS. (E.) Chessim, L. N., P. R. Glade, J. A. Kasel, H. L. Moses, R. B. Heberman and Y. Hirshaut. Ann. ntern. Med. 69(2):333-359, 1968.

This review of the clinical and laboratory studies n 102 pts. with infectious mononucleosis (IM) ncludes viral studies and discusses the herpes-ike virus as being etiologically related to IM. Studies with cell lines derived from pts. with Burkitt lymphoma are also reviewed. (P. Levine)

9-773 HERPESVIRUS TYPE 2: ASSOCIATION WITH CARCINOMA OF THE CERVIX. (E.) Rawls, W. E. (Baylor U. Coll. Med., Houston, Tex.), W. A. F. Tompkins, M. E. Figueroa and J. L. Melnick. Science 161(3847):1255-1256, 1968.

Neutralization kinetics studies demonstrated antibody responses to Type 1 (oral) and Type 2 (genital) herpesvirus infection which could be ndependently measured and correlated with the type of virus isolated from the pt. The presence of antibodies to Type 1 and Type 2 herpesvirus was examined in pts. with carcinoma of the cervix, in matched controls, random controls and pts. with other types of malignancy. Antibodies to Type 2 were found with greater frequency in pts. with carcinoma of the cervix (83%) than in the other groups tested (0-20%). The data suggest an association of genital herpesvirus and carcinoma of the cervix. (L. V. Scott)

69-774 SIGNIFICANCE OF THE HALO CELL IN PREMALIGNANT DYSPLASIA OF THE CERVIX. (E.) Ayre, J. E. (Nat. Cancer Cyt. Ctr., New York, N. Y.), J. M. LeGuerrier and F. A. Ressel. Cancer Cyt. 8(1):49-58, 1968.

Examination of 10,090 cervical cytological specimens (submitted for diagnosis to the National Cancer Cytology Center in Miami during 1963), showed halo cells in 41 specimens (0.41%), all in preneoplastic specimens. The incidence of halo cells was 16/376 (4.14%) in Grade IB (inflammatory with anaplastic tendencies), 20/89 (22.5%) in Grade IIA (minimal precancer cell complex) and 5/57 (8.8%) in Grade IIB (max. precancer cell complex), for a total incidence of 5.6% in Grades IB-IIIA (carcinoma *in situ*) and 1.8% in Grades IIA-IIIA (185 pts.), inclusive. It is suggested that the halo cell is among the earliest light microscopic cellular abnormalities indicating a possibility of impending carcinoma. Its disappearance in unison with its presumptive virus associates, before the stage of carcinoma *in situ* is reached, appears to indicate either a common etiology or a causal relationship between the halo cell and a virus. The halo cell was not seen in any normal or carcinoma specimens, even carcinoma *in situ*.

69-775 IMMUNOFLUORESCENT STUDIES IN HUMAN LEUKEMIA. (E.) Yohn, D. S. (Roswell Park Mem. Inst., Buffalo, N. Y.), J. S. Horoszewicz, R. R. Ellison, A. Mittelman, L. S. Chai and J. T. Grace, Jr. Cancer Res. 28(9): 1692-1702, 1968.

Pellets from the final high-speed centrifugation of citrate-diluted plasma from untreated or relapsing leukemia pts. were used to prepare rabbit antisera. All final pellets contained virus-like particles under the electron microscope, while control pellets from normal subjects did not. Globulin fractions of antisera to leukemic plasma pellets (LPA), labeled with fluorescein isothiocyanate and fully absorbed with normal human peripheral blood constituents + powdered liver or spleen, yielded positive cytoplasmic reactions with peripheral WBC from 10/29 pts. with myeloid leukemia, but similar preparations from normal subjects did not. Immunofluorescent-positive myelocytes were found in the bone marrows of 5/5 with positive peripheral WBC; this reaction was not seen in cultured WBC, leukemic bone marrow lymphocytes, cells from normal subjects or cells from pts. with disorders other than myeloid leukemia. The antibody activity of the LPA preparations was destroyed by absorption with pooled or individual human bone marrow powders. A few control reactions of very low intensity suggested that the antigens in question were probably also present in some of the normal human bone marrow cells, but in conc. too low for reliable detection by direct immunofluorescence. Results failed to support the hypothesis that such antigens are viral-associated phenomena.

69-776 THE ISOLATION OF A MYXO TYPE VIRUS FROM TWO HUMAN SARCOMAS. (E.) Stewart, S. E. (NCI, Bethesda, Md.). Bibl. Haemat. 30:333-334, 1968.

A myxo type virus, morphologically resembling Type C mouse virus but differing from it in producing cytoplasmic nucleoprotein strands in WI38 human diploid fibroblasts, was isolated from 2 human liposarcomas. The virus titrated out to 10^{-7} in WI38 cells.

69-777 ELECTRON MICROSCOPE STUDY OF HUMAN LEUKEMIC CELLS IN TISSUE CULTURE. (E.) De Harven, E. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.). Bibl. Haemat. 30:300-302, 1968.

No virus-like particles of any type were seen in thin sections of 20 cell lines from non-African cases of human leukemia, even in cultures starved for 1 wk. Herpes-like virus was seen in some cell lines of African origin (8 lines are identified, some of which may be Burkitt lymphoma). These particles were seen almost exclusively in degenerating cells and the number of particles increased when degeneration was moderately enhanced by starving the cultures for 1 wk.

69-778 RELATION BETWEEN MYCOPLASMAS AND LEUKAEMIA AND RELATED DISEASES. (E.) Fallon, R. J. (Ruchill Hosp., Glasgow, Scotland) and D. K. Jackson. Brit. Med. J. 4(5625):225-228, 1968.

Examination of bone marrow specimens from 45 pts. with leukemia and lymphoma and 40 normal bone marrow specimens yielded no specimens of *Mycoplasma*. Sera from pts. with leukemia and lymphoma showed about the same antibody reactivity to *M. pulmonis* (strains Negroni and #880) and *M. fermentans* (strains PG18, K7 and K10) as sera from pts. without leukemia.

69-779 THE EFFECT OF SOME LEUKEMOGENIC VIRUSES ON IMMUNE REACTIONS. (E.) Salaman, M. H. (London Hosp. Med. Coll.). Bibl. Haemat. 30:92-96, 1968.

The immunosuppressive effects of Friend leukemia virus (FV; 10^3-10^4 ID_{50}) were studied in BALB/c mice by the splenic hemolytic plaque-forming response to sheep RBC (FV was admin. 7 days before-1 day after the RBC). Both 19S and 7S antibody-forming cells were markedly depressed by FV after primary or secondary antigen stimulation. At the antigen doses used, no immunosuppression was seen in the first 2 days after primary stimulation, indicating that FV did not affect the first stages of the primary response. A polycythemia-inducing strain of FV, Rauscher leukemia virus and an agent isolated from urethan-induced leukemia caused similarly rapid depression of hemagglutinin production, but Moloney leukemia virus did not.

69-780 ARE THE NEOANTIGENS INDUCED BY LEUKEMOGENIC VIRUSES PARTICULAR TO CANCER CELLS? (E.) Mathé, G. (Paul Brousse Hosp., Villejuif, France). Bibl. Haemat. 30:43-47, 1968.

In (DBA/2 x CBA)F_1 and BALB/c mice, skin grafts from mice of the same strains treated with Friend (FV) or Rauscher leukemia virus, resp., showed a shorter survival time than skin isografts from non-leukemic mice. The graft rejection times resembled those seen with skin allografts or skin from the site of 9,10-dimethylbenzanthracene inj. (625 µg). This new antigenicity of the leukemic skin was related to the presence of leukemia virus (as shown by electron microscopy and the fact that mice with isografts from leukemic donors died of leukemia within 100 days); however, it was not dependent on the presence of virus in the skin graft or on the development of leukemia in the donors, since similar rejection patterns were seen in mice with skin grafts from FV-treated C57Bl6 mice, which are resistant to FV. Further studies showed that this new skin antigen of leukemic mice was common to mice of the same strain admin. the same virus, and to the skin cells and the leukemic cells. This antigen also depressed transplantation immunity in (DBA/2 x CBA)F_1 mice with skin grafts from FV-treated C57Bl6 mice, and in Gross leukemia virus-carrying (C57Br x Ak)F_1 mice with skin grafts from AkR or C57Br mice.

69-781 ABILITY OF AN ERYTHROPOIETIC VIRUS TO INITIATE ERYTHROPOIESIS IN HYPERTRANSFUSED-POLYCYTHEMIC MICE. (E.) Mirand, E. A. (Roswell Park Mem. Inst. Buffalo, N. Y.) and J. T. Grace, Jr. Bibl. Haemat. 30:61-63, 1968.

Erythropoietin (E) biosynthesis and morphological signs of erythropoiesis were markedly depressed in hypertransfused-polycythemic (HP) HA/ICR Swiss mice. Erythropoiesis was stimulated by E or by polycythemia virus (PV) in HP mice, as shown by ^{59}Fe incorporation into blood, bone marrow and spleen. Two possible mechanisms of action of PV are suggested: stimulation of E-producing cells releasing E, with subsequent differentiation of the stem cells to erythroid cells; or erythroid stimulation independently of E, suggesting that PV (like E) induces enzymes in the stem cells, thereby stimulating their differentiation. Neither the Friend nor the Rauscher leukemia virus stimulated erythropoiesis in HP mice, although both leukemia viruses (like PV) enhanced it in non-HP mice. This absence of erythropoietic stimulation could not be explained by differences in virus titer at the time of inoc. It is suggested that the cell type(s) required for replication of the 2 leukemia viruses did not appear in the HP state.

69-782 INDUCTION OF IMMUNITY IN MICE WITH TISSUE CULTURE CELLS CHRONICALLY INFECTED WITH RAUSCHER MURINE LEUKEMIA VIRUS. (E.) Mayyasi, S. A. (Chas. Pfizer Co., Inc., Maywood, N. J.), H. F. Foster, L. M. Bulfone, B. S. Wright and G. P. Shibley. Proc. Soc. Exp. Biol. Med. 128(4):1088-1092, 1968.

In weanling BALB/c mice, s.c. immunization by attenuated Rauscher leukemia virus (RV) or intact and ruptured cells of several RV-infected tissue culture strains from BALB/c mice (JLS-V5 spleen and thymus or JLS-V10 bone marrow, of low or high RV yield) conferred immunity to a transplanted RV-induced sarcoma and to RV leukemogenesis (10-14 days after the end of immunization). Best results were seen with attenuated RV and intact JLS-V5 cells. The partial protection conferred by ruptured RV-containing cells was attributed to the presence of RV particles or undetected intact cells in the preparation. Since an uninfected cell line (JLS-V6) conferred no tumor immunity, it is concluded that only RV infection induced immunity in these animals.

69-783 COMPARISON OF THE LATENT "VIRUS" OF L CELLS WITH THE RAUSCHER MOUSE LEUKEMIA VIRUS. (Ger.) Schäfer, W. (Max Planck Inst. Virus Res., Tübingen, Germany), H. Frank and L. Pister. Z. Naturforsch. [B] 23(9):1275-1276 b, 1968.

Density gradient centrifugation of Rauscher leukemia virus and the agent from L cells yielded similar patterns, with a large peak at 3S (containing the specific antigens) and a smaller peak at 18S (containing virus particles morphologically similar to mouse leukemia virus [MLV] under the electron microscope). MLV and avian leukosis virus (ALV) particles were morphologically similar, but ALV preparations had sedimentation peaks at 3S and 20S. It is concluded that L cells contain a virus of the MLV group. Similar results were obtained by serological investigation of LS cells (L cells propagated in suspension cultures) and RVP_3 cells (cells from C57/Bl mice transformed by Rous sarcoma virus).

69-784 CYTOCHEMICAL DEMONSTRATION OF ACID PHOSPHATASE IN PERIPHERAL BLOOD CELLS IN RAUSCHER VIRUS INFECTION. (E.) Lawrence, S. A. (U. Oregon Med. Sch., Portland), R. E. Mass and B. V. Siegel. Proc. Soc. Exp. Biol. Med. 129(1):175-179, 1968.

Peripheral blood alkaline phosphatase (AP) activity was followed histochemically for up to 4 wk. in 20 female BALB/c/jax mice infected with Rauscher leukemia virus (RV). In uninfected controls, AP-containing granules (apparently lysosomes) were seen in an av. of 52% of the peripheral lymphocytes and 34% of the neutrophils (av. 2.5 and 1.4 granules/cell, resp.). In RV-infected mice, the percentage of AP-positive cells and the number of granules/cell increased progressively. In 3/20 RV-infected mice that died of infection within 3 wk., the peripheral blood picture was normal but over 90% of the lymphocytes and neutrophils were AP-positive. Nucleated RBC (each with 1-2 AP granules) appeared only in the peripheral blood of RV-infected mice; they were seen in 16/17 of the 3-wk. survivors (in 1/17, nucleated RBC appeared 1 wk. later; this was the only animal surviving 7 wk.). It is suggested that activation of lysosomal enzymes is of importance in leukemic transformation.

69-785 ELECTRON MICROSCOPIC STUDIES ON THE ORGAN DISTRIBUTION OF GRAFFI LEUKEMIA VIRUS IN LEUKEMIC AND PRELEUKEMIC MICE. (E.) Bierwolf, D. (Ger. Acad. Sci., Berlin). Bibl. Haemat. 30:57-60, 1968.

In newborn and adult mice infected with Graffi leukemia virus (GV), there was no age difference in virus conc. or organ distribution. No difference in the organ distribution or ultrastructure of the GV particles was seen in animals developing different types of leukemia, except that 2 reticulum cell leukemias showed large crystal-like needles in the cytoplasm of macrophage-like cells. Many mature Type C particles and a few immature Type A particles were seen in the extracellular spaces of bone marrow, lymph node, spleen, thymus and liver cells. Type A and C particles were also noted in the salivary glands of leukemic mice. GV particles and budding immature Type A particles were seen in splenic and marrow megakaryocytes in the preleukemic and leukemic stages. The mammary glands were not examined.

69-786 NEW ONCOGENIC VIRUS PRODUCING ACUTE LYMPHATIC LEUKEMIA IN GUINEA PIGS. (E.) Opler, S. R. (Columbia U., New York, N. Y.). Bibl. Haemat. 30:81-88, 1968.

Guinea pig leukemia virus (GPLV) induced acute lymphoblastic leukemia in nearly 100% of Strain 2 guinea pigs or their F_1 hybrids 18-34 days after inoc. (i.p. in 1 experiment). The responses of young and adult animals to GPLV were about the same; the clinical course and autopsy findings were similar to human acute leukemia. Cell-free preparations of GPLV (containing a high conc. of Type C particles) were leukemogenic at very low conc. (1 ml of 1:1000 dilution); extracts of plasma, lymphatic tissue, spleen and brain were also leukemogenic. The virulence of GPLV increased markedly during 150 serial passages in hybrid Strain 2 guinea pigs and was highly antigenic in homologous animals. GPLV proved sensitive to X-rays, UV, heat and several chemicals, but was resistant to trypsin. It was morphologically and antigenically distinct from the mouse leukemia viruses.

69-787 A LEUKEMOGENIC FILTERABLE AGENT FROM RETICULAR CELL NEOPLASMS IN THE SJL/J STRAIN OF MICE. (E.) Haran-Ghera, N. (Weizmann Inst. Sci., Rehovoth, Israel) and M. Kotler. Bibl. Haemat. 30:70-72, 1968.

In SJL/J mice, the incidence of spontaneous reticulum cell tumors (RCT; sometimes resembling human Hodgkin's disease) was 70-80%. Fractionated doses of X-rays (800 r over 4 wk.) induced lymphatic leukemia in 85%; 1 large X-ray dose (200-550 r) induced myeloid leukemia in 24-45%. Feeding of 7,12-dimethylbenzanthracene (DMBA; 1 dose/wk. of 1 mg x 5 or 10 wk.) induced lymphosarcoma in 73-83% (thymectomy did not modify this tumor incidence). In thymectomized, irradiated (550 r, 1 dose) SJL/J mice, inj. of cell-free extracts of these tumors into thymus or (sometimes) spleen isografts induced lymphatic leukemia in the hosts, indicating the presence of a filterable leukemogenic agent; in 1 experiment, cell-free filtrates of DMBA- or radiation-induced leukemia induced leukemia after inj. into thymus grafts, but stimulated the development of RCT when inj. into spleen isografts. Cell-free extracts of tissues from SJL/J mice treated 10 days previously with X-rays + either DMBA or urethan were also leukemogenic after inj. into thymus grafts.

69-788 THE ASSOCIATION OF MURINE LYMPHOMA WITH REOVIRUS TYPE 3 INFECTION: THE DEVELOPMENT OF NEOPLASIA IN AN ANIMAL SUFFERING FROM CHRONIC REOVIRUS 3 DISEASE. (E.) Keast, D. (U. Western Australia, Perth), N. F. Stanley and P. A. Phillips. Proc. Soc. Exp. Biol. Med. 128(4):1033-1038, 1968.

A thymic lymphoma (designated 4261/T) from an adult mouse (250 days old) with chronic reovirus 3 (RV3)-induced runt disease was transplanted for 12 passages in newborn Prince Henry strain mice, the most consistent features of the transplants being macroscopic lymphomas in the kidneys and/or jaws. Unlike the reovirus-induced 2731/L lymphoma, the 4261/T lymphoma did not induce tumors in young adult Balb/C mice. Low titers of RV3 antigens were seen in the early transplant passages, but no antibody was detected in tumor-bearing mice of these groups. Signs of RV3 infection and complement-fixing antibodies were detected in mice in the passage 12 and 13 groups, but later transplant passages were negative. Attempts to induce tumors in newborn mice by cell-free extracts of 4261/T, or to demonstrate mouse leukemia viruses in this tumor, were unsuccessful.

69-789 ELECTRON MICROSCOPIC STUDIES OF RADIATION-INDUCED LEUKEMIA IN MICE: VIRUS RELEASE FOLLOWING TOTAL-BODY X-RAY IRRADIATION. (E.) Gross, L. (VA Hosp., Bronx, N. Y.) and D. G. Feldman. Cancer Res. 28(9):1677-1685, 1968.

In female C3Hf mice treated with 1 or several doses of X-rays (150-750 r) at age 3-5 wk., leukemia virus particles budding from the cell membranes of bone marrow, spleen and lymph node cells, and both mature and immature Type C particles in the intercellular spaces, were seen within a few days after irradiation. Leukemia virus particles were also seen in the same tissues of 8/8 mice (2 males, 6 females) with leukemia induced by X-rays (150 r x 4). The distribution of virus particles in these mice resembled that seen in mice with spontaneous or virus-induced leukemia, but fewer particles were seen than in mice with Gross virus-induced leukemia. Only a few, isolated virus particles were seen in the thymus (occasionally the bone marrow and lymph nodes) of non-irradiated C3Hf mice.

69-790 LEUKOSIS WITH MONOCYTE-LIKE CELLS IN DOG. (E.) Groulade, P. (38, rue de Paris, 91 Orsay, France). Bibl. Haemat. 30:271-272, 1968.

One male (Beauceron shepherd) and 2 female dogs (spaniels) with monocytic leukemia are described. The clinical courses resembled Stage III or chronic leukemia in 2/3 and acute leukemia with a remission in 1/3. No transmission studies are described.

69-791 MICRO-ELECTROPHORESIS OF PROTEINS IN THE COURSE OF MYELOID AND LYMPHOID LEUKOSIS IN DOG. (E.) Groulade, P. (38, rue de Paris, 91 Orsay, France). Bibl. Haemat. 30:273, 1968.

In 6 dogs with myeloid leukosis, α_1 and γ-globulin increased slightly in the first 15 days; after 3 wk., albumin fell 8-20%, β- and γ-globulins increased slightly (3-7% and 2-5%, resp.) and α_2 globulins were normal or slightly increased (1-3%). In 20 dogs with lymphatic leukosis, serum proteins varied according to disease type. In acute leukosis, albumin fell and α_2-globulin rose slightly (2-5% and 5-10%, resp.); γ-globulin was unchanged and β-globulin was normal or slightly reduced. In dogs with rapidly progressing chronic leukosis, α_1 and α_2-globulins rose 2-5%, β-globulins fell 1-3% and albumin and γ-globulin levels remained unchanged during the first wk. After 3 wk., α_2-globulin rose 5-10%, β-globulin fell 3-5%, albumin was unchanged and γ-globulin was normal or reduced. In slowly progressing chronic leukosis, little change in serum proteins was seen in the first 3 mo. After this time, albumin fell 10-25%, γ-globulin rose 15-30%, β-globulin rose 5-15% in most animals and α_2-globulin fell slightly in some animals.

69-792 STUDIES OF CANINE LEUKEMIA IN TISSUE CULTURES AND AXENIC MICE. (E.) Chin, T. D. Y. (Nat. Communicable Disease Ctr., HEW, Kansas City, Kans.), A. L. Chapman, C. R. Gravelle, A. A. Werder and A. H. Nielsen. *Bibl. Haemat.* 30:274-275, 1968.

Electron microscopic examination of cultured monolayers from a spontaneous canine reticulum cell leukemia (from a 3-yr.-old male German shepherd) showed Type C virus-like particles; after 68 passages, virus-like particles budding from the cell membranes were also seen. Cells and cell-free filtrates from 5 different *in vitro* passages induced reticulum cell leukemia in 100% of each group of axenic infant CFWw mice, after latent periods of 2-4 mo. Virus-like particles of the Type C type were also seen in leukemic mouse tissues. Subsequent mouse-to-mouse passages reduced the induction time to 2-4 wk. Tissue homogenates obtained from the dog did not induce clinical leukemia in the axenic mice after 1 yr. of observation, but tissues from 2 mice sacrificed 5 mo. after inoc. showed Type C virus-like particles.

69-793 CELLULAR AND CELL-FREE TRANSMISSION OF A CANINE MAST CELL LEUKEMIA. (E.) Rickard, C. G. (Cornell U., Ithaca, N. Y.) and J. E. Post. *Bibl. Haemat.* 30:279-281, 1968.

Tumor and liver suspensions from a 9-yr.-old male beagle with spontaneous mast cell leukemia (involving the blood, liver, spleen and lymph nodes but not the skin) induced the same disease in 3/5 2-wk.-old puppies after latent periods of 27-98 days. The next 14 serial passages of cell suspensions were performed in 1-7-day-old puppies, inducing leukemia in at least 50% of each group. In the later passages, the tumor take rose to 100% and the latent period fell to 6-8 days. Cell-free suspensions (including cell-free ascites or pleural fluid) did not induce tumors in newborn puppies until passage 8. The tumor take was 6/42 in passages 8-12 and rose to 100% with passages 14-15. The leukemic cells showed a reduced number of chromosomes (but not as low as 60 chromosomes) and additional metacentrics. The induced tumors resembled the spontaneous mast cell leukemia.

69-794 CANINE LYMPHOSARCOMA MAINTAINED IN SERIAL PASSAGE. (E.) Moldovanu, G. (Sloan-Kettering Inst. Cancer Res., N. Y.), A. E. Moore, M. Friedman, and D. G. Miller. *Bibl. Haemat.* 30:276-278, 1968.

Cell suspensions from spontaneous lymphosarcomas of 2 adult dogs (treated previously with cyclophosphamide) induced palpable tumors of the supraclavicular lymph nodes (the site of s.c. inoc.) in 100% of irradiated newborn puppies. Females showed mammary nodes as well as supraclavicular lymphadenopathy. The first-passage tumors had a latent period of 16 days or less and the av. survival time was 25 days. Further experiments showed that radiation conditioning (110 r of total-body radiation was well tolerated) within 24 hr. after birth was essential to tumor take, while immunosuppressive therapy (azathioprine or propiomazine) was helpful but not essential. After passage 3 the initial tumor take was still 100%, but 15-40% of the animals later showed complete regression of the palpable tumors (although tumor cells persisted in the bone marrow); animals with regressed tumors rejected further tumor cell challenges, even after further irradiation. Attempts to induce this lymphosarcoma by cell-free preparations were unsuccessful.

69-795 CELLULAR CONVERSION INDUCED BY MOUSE SARCOMA VIRUS (MOLONEY) *IN VITRO*. ANALYSIS OF THE DOSE-RESPONSE CURVE. (Fr.) Bernard, C. (St. Louis Hosp., Paris), B. Guillemain, J. Peries and M. Boiron. *Int. J. Cancer* 3(5):558-565, 1968.

Moloney mouse sarcoma virus (MSV; 10^{-2}-10^{-4} dilution) was propagated in primary cultures of embryonic rat (Wistar CF) or mouse (C57BL or Swiss) fibroblasts or in long-term cultures of BALB/c mouse lung or brain cells (cell lines #8828 and #3085, resp.). MSV was obtained from 78A1 cells *in vitro* or from tumors induced by i.m. inoc. of cell-free filtrates in BALB/c or Swiss mice (under 10 days old). The initial MSV-induced changes resembled a CPE rather than malignant transformation. Titration curves of FFU activity (which was less in the rat fibroblasts than in the mouse cells) showed that Moloney leukemia virus (MLV) acted as a helper for MSV focus initiation, but some of the MSV stocks contained particles that could initiate foci without the aid of MLV.

69-796 BIOCHEMICAL STUDIES ON CELLS INFECTED WITH RNA-CONTAINING TUMOR VIRUSES. (E.) Bader, J. P. (NCI, Bethesda, Md.) and A. F. Valentine. *Bibl. Haemat.* 30:34-36, 1968.

Several tumor cell lines induced by Rous or Moloney sarcoma virus (RSV and MSV, resp., including rat cells infected with MSV or the Schmidt-Ruppin strain of RSV and hamster cells infected with these viruses and the defective

Bryan strain of RSV) showed specific viral genomes in cocultivation experiments. Fluids from these cultures did not induce transformation of hamster kidney or chick and rat embryo cells; culture fluids from these infected cells contained no infectious MSV or RSV particles. Electron microscopic examination of both rat tumor cell lines and their fluids showed small numbers of virus particles, resembling typical leukemia virus. High molecular wt. RNA extracted from RSV- and MSV-infected cells was identified as typical leukemia virus RNA (infectious RNA from RSV was used as a control). The hamster cells and their fluids contained no virus particles or viral RNA. It is concluded that the MSV- and RSV-transformed cells produced defective MSV and RSV, resp. The failure of the hamster tumor cells to produce virus particles indicated host control over the production of RNA-containing tumor viruses.

69-797 MULTIPLICATION OF AVIAN LEUKOSIS VIRUS IN THE REPRODUCTIVE SYSTEM OF THE ROOSTER. (E.) DiStefano, H. S. (State U. New York Upstate Med. Ctr., Syracuse) and R. M. Dougherty. *J. Nat. Cancer Inst.* 41(2):451-464, 1968.

Electron microscopic examination of reproductive organs from male chick embryos and roosters, congenitally infected with avian leukosis virus, revealed viral multiplication in all connective tissue elements, in smooth muscle within the walls of tubular structures and in nongerminal epithelial cells. There was no evidence of viral budding from germinal cells in either embryos or adult roosters. Many free viral particles were found among connective tissue and smooth muscle cells and some free particles were seen in lumina of tubular structures.
(E. Y. Lasfargues)

69-798 THE INFLUENCE OF ANTIBODIES *IN VIVO* AND *IN VITRO* ON CELLULAR AND CELL-FREE PREPARATIONS OF A TYPE III AVIAN LEUKOSIS VIRUS. (E.) Sevoian, M. (U. Massachusetts, Amherst). *Bibl. Haemat.* 30:104-108, 1968.

Mature (1-yr.-old) New Hampshire Red chickens (15 females, 1 male) were immunized against Type III leukosis virus (lymphatic type; T virus) by i.m. inj. of serum from an experimentally infected chick; the vaccine contained about 200 chick lethal doses (CLD) of virus. Prevaccination sera had no significant neutralizing capacity against cell-free T virus; sera taken 8 wk. after vaccination neutralized up to about 1000 CLD_{50}, while sera from untreated controls remained inactive. The immune serum had no effect on washed T virus-infected cells after 1 hr. *in vitro*, followed by inj. into susceptible chicks. Examination of the yolk sacs of chick embryos from vaccinated females demonstrated congenital antibodies, which neutralized $10^{2.4}$-$10^{3.5}$ chick embryo ID_{50} of cell-free T virus; similar neutralization was seen in trials of serially diluted, washed whole blood cells in embryos with congenital antibodies. Cell-free and cell-containing preparations of T virus were also neutralized in chicks with congenital antibodies.

69-799 CONTROL OF AVIAN LEUKOSIS IN HUNGARY. (E.) Bamberger, K. (Hungarian Acad. Sci., Budapest). *Bibl. Haemat.* 30:111-115, 1968.

The annual loss from avian leukosis (compared to the annual output of the poultry industry) in 1965 was 0.3% in Hungary, 6% in the United Kingdom, 2% in the USA and 5% in France. An increase of losses since 1961 in Hungary was prevented by planned breeding: chickens were reared in complete isolation until at least 10 wk. old and eggs exclusively from layers aged 12 mo. or more were used for breeding (when eggs from layers less than 12 mo. old were used, losses from avian leukosis tended to increase). The losses from avian leukosis among dead or emergency slaughtered mature fowl in Hungary were 1.7% in 1952, 2.9% in 1953, 2.1% in 1954, 2.9% in 1955, 5.5% in 1957, 7.8% in 1961, 2.0% in 1963, 2.7% in 1964, 2.2% in 1965 and 1.6% in 1966. Control by natural selection appeared to be the method of choice. The establishment on a national level of strains with genetic resistance to avian leukosis is impractical, but leukosis virus-free flocks have been established in Hungary and the eggs are being used for preparing live virus vaccines.

69-800 LEUKOSIS VIRUSES OF CHICKEN: STRUCTURE, ANTIGENIC BEHAVIOUR AND CELL INTERACTIONS. (E.) Bauer, H. (Max Planck Inst. Virus Res., Tübingen, Germany) and W. Schäfer. *Bibl. Haemat.* 30:26-30, 1968.

Electron microscopic examination and rabbit antiserum tests of the avian myeloblastosis virus (AMV) suggested that the type-specific viral (V) and group-specific (gs) antigens are produced by the surface protrusions and the filamentous inner core of the AMV particle, resp. Complement fixation and cross-reaction tests with rabbit anti-gs serum (for AMV) and sera from hamsters, rats and mice with tumors induced by the Prague or Schmidt-Ruppin strains of Rous sarcoma virus (RSV) suggested that the transplantation antigens are different from both the V and gs antigens. It is concluded that the virus-specific gs antigen in some mammalian RSV tumors is identical with an inner component of the RSV particle, and that non-virus-producing tumor cells synthesize some structural component of the virus particle. Some mammalian RSV tumors contained a common transplantation antigen, but did not react in the complement fixation test and could not be back transferred to chickens. The other tumors, which contained the gs antigen, could be transplanted in chickens, suggesting that at least part of the RSV genome was replicated and active in these tumor cells.

69-801 DEMONSTRATION OF SEGMENTS OF RIBONUCLEIC ACID COMMON TO AVIAN MYELOBLASTOSIS VIRUS (AMV) AND NEWCASTLE DISEASE VIRUS (NDV). (Fr.) Rosenbergova, M. (Gustave-Roussy Inst., Villejuif/Seine, France) and J. Huppert. C. R. Acad. Sci. [D] (Paris) 267(9):911-914, 1968.

Uridine-^{3}H incorporation into fractions A (28S and over) and B (18S) RNA was studied in chick embryo cells infected with Newcastle disease (NDV) and avian myeloblastosis (AMV) viruses. Hybridization of fractions A and B of labeled RNA from NDV-infected cells with unlabeled RNA from either NDV or AMV virions yielded a high proportion of RNase-resistant material (42-57% in the AMV hybrid). Molecular wt. determinations of fraction A and AMV RNA showed that the fraction of RNA common to both viruses comprised no more than 5% of the AMV genome. Latent infection of the cells by a virus of the AMV group with RNA capable of hybridizing with NDV RNA was excluded, since (a) the cells were obtained from a leukosis virus-free strain, and (b) actinomycin D inhibited label incorporation into RNA of non-infected cells (this also eliminated the possibility of hybridization of cellular messenger RNA with contaminating DNA). Contamination of AMV particles or RNA with NDV was excluded, since (a) AMV RNA sedimenting below 60S was studied and (b) most of the RNA from NDV-infected cells forming hybrids with RNA from AMV was in fraction A. No hybridization between NDV and fowl plague virus RNA was noted.

69-802 COMPARISONS OF SIZE AND SITE OF TUMORS WITH BLOOD FINDINGS IN LYMPHATIC LEUKOSIS OF ADULT CATTLE. (E.) Stöber, M. (Vet. Sch., Hannover, Germany). Bibl. Haemat. 30: 212-213, 1968.

In 81 adult cattle with tumorous lymphatic leukosis, there was no correlation between the degree of leukemia and the grade of anemia, indicating anemia of extramedullary origin. A highly significant correlation existed between the number of lymphocytes and their maturity. The correlation between organ tumors and aleukemia on the one hand, and lymph node or organ + lymph node tumors with leukemia on the other hand, was significant. No correlation was found between the maturity of the lymphocytes and tumor site, but animals with splenomegaly showed a prevalence of immature lymphocytes. The total incidence of anemia increased from 45% in the early stages to 53% in the advanced stages, then fell to 37% in the final stages (probably because animals with hemorrhagic abomasal ulcers die or are slaughtered before reaching the final stages). Most animals with organ and lymph node tumors were in the advanced and final stages. Among organs most often and early affected by macroscopic tumors was the abomasum (64% incidence in early stages, 85% in advanced stages). This high incidence of abomasal tumors was highly significant and suggested an entrance site for the causal agent of lymphatic leukosis in cattle.

69-803 SUCCESSFUL EXPERIMENTAL TRANSMISSION OF BOVINE LEUKOSIS. (E.) Rosenberger, G. (Vet. Hosp., Berlin). Bibl. Haemat. 30: 136-139, 1968.

Unfiltered preparations of blood, milk and other tissues and fluids (lymph nodes, urine, feces and ruminal contents) from animals with bovine leukosis (BL) were admin. by several routes (s.c., i.m., i.v., p.o., i.p., intracutaneously, or by intrasplenic inj.) to calves from BL-free herds. Of the animals treated with BL preparations, 13/17 developed suspicious (3) or positive (10) blood pictures; 6/10 of the latter group developed tumorous BL after 2.5-14 yr. The other 4/17 remained hematologically and clinically normal. An untreated animal stalled among the treated ones became positive and died of tumorous BL after 4 yr. Isolated controls remained negative. To study placental transmission, 10 calves of hematologically positive or tumorous cows were fed milk from cows free of leukosis. All of the calves developed lymphocytosis after 3 mo. and 3/10 died of tumorous BL after 2.5-10.5 yr. Of 6 calves from BL-free herds fed milk from hematologically positive or tumorous cows, 3/6 animals died of intercurrent causes and 2/3 of the remaining animals developed tumorous BL after 10-10.5 yr. Of 3 calves pricked with a needle which had just been used for blood sampling of animals with tumorous BL (2 animals) or inj. intradermally with tuberculin from a cannula which had just been used on an animal with BL, 3/3 became hematologically positive and developed tumorous BL within 4 yr. (tuberculin cannula) or 8.5-10 yr. (blood sampling cannula). It is concluded that BL may be transmitted vertically or horizontally.

69-804 OBSERVATIONS ON CATTLE INOCULATED WITH BOVINE LYMPHOSARCOMA MATERIAL. (E.) Hatziolos, B. C. (U. Maryland, College Park). Bibl. Haemat. 39:140-143, 1968.

Several experiments in newborn calves treated with tissue emulsions or sonicates of bovine lymphosarcoma (by inj. or p.o. in milk) are briefly described. Milk transmission of the bovine leukosis (BL) agent was suggested by 1 study in calves fed milk containing tumor tissue sonicates. Other results suggested the presence in the tumor extracts of a lymphocytogenic factor, which is active at first and later becomes latent for an indefinite period, but which may be potentiated by unknown means and transform lymphocytosis into true BL.

69-805 TRANSMISSION ATTEMPTS IN BOVINE LEUKOSIS IN CALVES. (E.) Wittmann, W. (Ger. Acad. Agric. Sci., Berlin). Bibl. Haemat. 30:144-145, 1968.

Admin. (i.p. or s.c.) of blood from 3 cows with preleukemic lymphocytosis to newborn calves of leukosis-free cows induced persistent lymphocytosis in 2/8 animals; 1/2 with lymphocytosis and 1 hematologically normal animal later developed lymphadenopathy. Blood from the animals with persistent lymphocytosis, inj. into calves of leukosis-free cows, induced positive or possible hematological reactions in 3/7 calves. These transmissions apparently enhanced the virulence of the bovine leukosis agent.

69-806 EXPERIMENTS ON THE TRANSMISSION OF BOVINE LEUKOSIS BY COLOSTRUM AND MILK. (E.) Weinhold, E. (Max von Pettenkofer Inst., Berlin) and O. C. Straub. Bibl. Haemat. 30:146-148, 1968.

Colostrum or milk from cows with bovine leukosis (BL; lymphocytosis or tumor stages) did not induce BL in 15 newborn calves (from normal or leukotic mothers).

69-807 TRANSMISSION OF BOVINE LEUKOSIS BY SERUM, BLOOD, BONE-MARROW AND LEUKOCYTES. (E.) Weinhold, E. (Max von Pettenkofer Inst., Berlin) and O. C. Straub. Bibl. Haemat. 30:149-153, 1968.

Inj. of cell-free or cellular material (filtered serum, bone marrow or WBC homogenate, heparinized blood or bone marrow cells), from cows with bovine leukosis (BL), induced BL in 5/15 and 4/10 newborn calves (treated during the first 4 days of life), resp., from a BL-free population. Responses were "suspect" in 3/15 and 4/10, resp. The recipients included 12 males castrated before age 7 mo.; 7/12 showed BL symptoms and 3/7 died of BL. Only 2/13 females were BL-positive. The transmission of BL by cell-free material supported the hypothesis of the existence of a BL-inducing agent in cattle.

69-808 SIX YEARS OF RESEARCH ON TRANSMISSIBILITY OF BOVINE LEUKOSIS. (E.) Gentile, G. (Fac. Vet. Med., U. Bologna, Italy), P. S. Marcato and A. Mantovani. Bibl. Haemat. 30:162-165, 1968.

Cellular material from 1 calf with bovine leukosis (BL), serially transmitted to newborn calves (not over 12 hr. old), induced lymphadenopathy in recipients of passages 1-9, but not of passage 10. Lymphatic tissues of passages 6 and 7 showed a few virus-like particles. Two viral agents were isolated from lymphatic tissues of passages 7 and 9, and serially transmitted (25 and 15 times, resp.) in chick embryos, but egg passages 8 and 10, resp., of these agents, had induced no clinical or hematological symptoms in 2 calves by 10-11 mo. after inj. The results suggested possible transmission of the clinical, hematological and histological signs of the initial stages of BL.

69-809 EPIDEMIOLOGIC STUDIES ON THE MECHANISM OF VERTICAL AND HORIZONTAL TRANSMISSION OF BOVINE LEUKEMIA. (E.) Larson, V. L. (Coll. Vet. Med., U. Minnesota, St. Paul), D. K. Sorensen, V. Perman, R. K. Anderson, and R. E. Shope, Jr. Bibl. Haemat. 30:190-192, 1968.

A total of 45 cases of bovine leukemia (BL) were seen in 8 high-incidence herds and 20/45 cases were born within 1 mo. of 1 or more other cases. A high incidence of persistent lymphocytosis was seen in groups of animals born within 4 wk. of an animal which developed BL as an adult. Of 66 adult cows born in 15 neonatal cluster groups, 27 (41%) developed BL and 31 (47%) exhibited persistent lymphocytosis during adult life. Hematological analysis of 312 dam-daughter pairs in high-BL herds revealed familial similarities: 49% of the daughers of leukemic dams and 29% of the daughters of normal cows had persistent lymphocytosis. In the latter group, 88% were members of high lymphocytosis-incidence neonatal clusters.

69-810 THE IMPORTANCE WHICH OIE ATTACHES TO THE STUDIES OF EPIZOOTIOLOGY, DIAGNOSIS, AND CONTROL OF BOVINE LEUKOSIS. (E.) Vittoz, R. (Int. Off. Epizool., Paris). Bibl. Haemat. 30:224-227, 1968.

Three resolutions concerning bovine leukosis (BL) adopted by the OIE Committee in 1953, 1964 and 1967 are presented. Because of the hereditary character of BL, it was recommended that affected animals should not be used as breeding stock. A system of diagnostic examinations to prevent export and import of BL-affected breeding animals is recommended; evidence of the presence of BL should be assessed and controlled by blood examinations of all animals over 2 yr. old in the herd. Upper limits of the normal lymphocyte level in healthy animals for specific breeds, age and regions should be established.

69-811 EPIZOOTIOLOGY OF LEUKOSIS IN LARGE HERDS OF CATTLE. (E.) Stamatović, S. M. (Inst. Path. Ther. Domestic Animals, Belgrade) and M. J. Jovanović. Bibl. Haemat. 30:194-196, 1968.

In a herd of 1155 cattle of Yugoslavian and foreign breeds (Red Danish and black and white, mixed with domestic Simentals), housed in 10 stables of 90-123 animals each, with no outdoor pens and a stall for each animal (animals stayed in their places approx. 9 mo. of the yr.), the incidence of leukosis rose from 1.19-6.0%/stable from 1962-1965. The over-all incidence was 16.33 ± 1.21%. All animals were negative for brucellosis and their tuberculin tests were also negative. Of the leukotic animals, 41% were close to each other and 75.8% of the leukotic animals and suspicious cases were grouped at particular locations within the stables. The data support the theory of possible transmission of an agent, either through tuberculin testing or by direct transmission. Leukotic animals were fully productive and only non-productive animals were removed from the herd.

69-812 BOVINE LEUKEMIA: I. DISEASE IN ANIMALS LESS THAN 6 MONTHS; II. HEMATOLOGICAL EXAMINATION ON 180 CATTLE FROM A REGION WITH A HIGH INCIDENCE OF LEUKEMIA. (E.) Dechambre, R. P. (Gustave Roussy Inst., Villejuif, France), O. Weiler and F. Lacour. Bibl. Haemat. 30:217-218, 1968.

The normal incidence of bovine leukemia (BL) is 6/100,000 head. In 13 calves (under 6 mo.) with BL, the course was fulminating and the hematological findings resembled those of acute leukemia in children. This group (collected from several geographical areas) included 2 sets of twin calves developing BL simultaneously, suggesting vertical transmission of a virus-like organism. Examination of 180 cattle from a BL epizootic region of France (Mont de Marsan area) showed BL in 1/50 animals from previously unaffected herds and 9/130 from herds with 1 previous case of BL (4/9 occupied stalls beside those of animals that had died of BL, suggesting horizontal transmission of the disease).

69-813 THE EPIDEMIOLOGY OF BOVINE LEUKOSIS. (E.) Marshak, R. R. (U. Pennsylvania, Philadelphia) and D. A. Abt. Bibl. Haemat. 30:166-182, 1968.

The incidence of lymphocytosis in 2 herds of cattle with multiple cases of bovine leukosis (BL) decreased steadily from 1959 (30% in younger animals, 48-50% in older animals in both herds) to 1966 (10% in younger animals and 45% in older animals in 1 herd; 16% and 25%, resp., in the other). The herd with a smaller decrease in the incidence of lymphocytosis (44% to 28%; 36% to 20% in the other herd) had a slow turnover rate (58/100 at risk in 1959 were still present in 1966), a high level of inbreeding and a higher incidence of new cases of BL (not stated) than the other herd (in which the level of inbreeding had been curtailed over 8 yr.). Admin. of fresh suspensions of BL cells (20 ml i.m.) to 63 cattle from these 2 herds did not increase the incidence of lymphocytosis or BL (by comparison to 51 untreated animals from the same herds). These data led to the conclusion that persistent leukocytosis should not be equated with BL. Examination of the pedigrees of animals from an inbred herd of Jerseys traced 30/30 cases of BL back to only 3 closely related ancestors (2 males, 1 female), suggesting that genetic factors exert a determinant influence in BL, whatever the role of viral or other carcinogens. It is also suggested that epidemiologic studies alone cannot prove that BL is an infectious disease.

69-814 TEMPORAL AGGREGATIONS OF BOVINE LEUKOSIS IN MULTIPLE-CASE HERDS. (E.) Abt, D. A. (U. Pennsylvania, Philadelphia). Bibl. Haemat. 30:183-186, 1968.

A 17-yr. study of 23 herds of cattle with multiple cases of bovine leukosis (BL; 135 confirmed cases) showed single and multiple temporal clusters in 6/23 and 13/23 herds, resp. (4 herds had too few cases for classification). One non-inbred herd of Holsteins with a high replacement and expansion rate (240 animals at risk over 4 yr.) showed 4 apparently unrelated BL cases over 38 mo. (3/4 over 8 mo.) and 2 cases in a 2-wk. period 1.5 yr. later. Two cases of temporal BL clusters in highly inbred Jerseys are also described; 1/2 herds (100 animals at risk over 8 yr.; mean age 59 mo.) showed 10 cases in 3 generations over 10 yr., while 1/2 showed 4 cases over 19 mo. (3/4 were of an inbred stock with a high incidence of congenital malformations, 1/4 was an unrelated animal that died of BL within 1 mo. of an animal of the inbred stock). BL may appear after the introduction of an infectious agent into a genetically susceptible herd, but since 5/23 herds had shown no new cases of BL for 4-5 yr. at the time of report, the possibility of elimination of BL from a herd by natural selection is raised.

69-815 GEOGRAPHICAL DISTRIBUTION OF BOVINE LEUKOSIS IN FRANCE 1964, 1965 AND 1966. (E.) Lazar, P. (Nat. Inst. Health Med. Res., Villejuif, France) and H. Gasse. Bibl. Haemat. 30:187-189, 1968.

Bovine leukosis (BL) in France predominated in the northeastern and southwestern regions in 1964 through 1966 (av. 6 and 10/100,000 head, resp.); the areas of highest incidence tended to move progressively east and north, resp., during this time. The most affected region was the area of Mont-de-Marsan, with 16 cases of BL in 1964, 23 in 1965 and 27 in 1966 (1/1000 head). Most herds reared in this area comprised a few animals each, raised on isolated farms and fed only fodder. No main changes in agriculture or in stock raising were apparently introduced during the study period.

69-816 THE OCCURRENCE OF BOVINE LEUKOSIS FOLLOWING THE INTRODUCTION OF BABESIOSIS VACCINATION. (E.) Hugoson, G. (Nat. Vet. Inst., Stockholm), R. Vennström and K. Henriksson. Bibl. Haemat. 30:157-161, 1968.

In the Åland Islands, with about 5000 adult cattle (about 50 imported from Finland) in herds maintained by artificial insemination, the only known epizootic diseases before 1964 were enzootic babesiosis and 1 possible outbreak of rickettsiosis. Babesiosis vaccine (BV) was first used in 1958; after 1960, BV was prepared from the blood of calves from bovine leukosis (BL)-free herds ("BL-control" BV). From 1964-1967, 9 cases of BL were seen (3/9 in 1 herd over a 10-mo. period) in cattle from vaccinated herds (9/335 vaccinated animals, compared to 0/4700 in non-vaccinated animals). A hematological survey of 68 herds (494 animals) identified 30 "BL-affected" and 11 "BL-suspected" herds (on the basis of persistent lymphocytosis); 28/30 and 9/11 herds, resp., had received BV (including 8/14 and 4/14 herds, resp., admin. the "BL-control" BV only). Unvaccinated control herds were identified as "BL-positive" or "BL-suspected" in 2/25 cases, each. The 2 "BL-positive" control herds included 1 with a history of babesiosis and 1 which had included a vaccinated animal since 1959. It is concluded that the "BL-control" BV vaccine used in these animals conferred little protection against the development of lymphocytosis. It is suggested that BL cells or a BL agent may have been transmitted, but BL induction or latent BL promotion by Babesia seemed improbable (13/25 unvaccinated herds had histories of babesiosis, but 10/13 were without signs of BL).

69-817 RESULTS OF FOUR YEARS' COMBAT OF BOVINE LEUKOSIS IN THE SOUTHERN PART OF LOWER SAXONY. (E.) Schmidt, F. W. (U. Göttingen, Germany) and G. Hasse. Bibl. Haemat. 30:219-223, 1968.

A voluntary program in which animals and their offspring from leukosis-affected herds could be sold only for slaughter for a period of 3 yr. reduced the number of herds with persistent lymphocytosis from 71/251 in 1964 to 21/251 in 1967. The efficiency of this method was tested on a large scale in 4 districts of Lower Saxony. In 1964, 175/6061 (2.9%) of all herds were leukosis-positive and 273/30,052 animals (0.9%) showed persistent lymphocytosis; in 1967 these figures were 59/4519 (1.3%) herds and 75/26,617 (0.3%) animals, resp.

69-818 EFFECT OF IMMUNOSUPPRESSION ON CLINICAL AND PATHOLOGIC MANIFESTATIONS OF MAREK'S DISEASE IN CHICKENS. (E.) Foster, A. G. (Washington State U., Pullman) and T. Moll. Amer. J. Vet. Res. 29(9):1831-1835, 1968.

Bursectomy or admin. of large doses of cortisone acetate or 6-mercaptopurine altered the pathogenesis of Marek's disease in chickens. These findings supported the hypothesis that the clinical and histopathological manifestations of Marek's disease may be due, in part, to immunological conflicts. An infectious agent may initiate the primary damage, but subsequent pathological manifestations may have an immunological basis. (B. R. Burmester)

69-819 SURVIVAL OF MAREK'S DISEASE AGENT IN LITTER AND DROPPINGS. (E.) Witter, R. L. (Reg. Poultry Res. Lab., East Lansing, Mich), G. H. Burgoyne and B. R. Burmester. Avian Dis. 12(3):522-530, 1968.

Of 30 samples of litter and droppings from chickens inoc. with the JM or GA strain of Marek's disease, tested by direct exposure of chicks, 17/23 of the JM samples and 1/7 of the GA samples induced Marek's disease (MD). The MD agent could survive up to 16 wk. in litter and droppings held under environmental conditions not unlike those of a commercial poultry house. It is suggested that litter and droppings may be potential environmental reservoirs of the MD agent. (E. L. Stubbs)

69-820 STUDIES ON ACUTE MAREK'S DISEASE. I. CHARACTERISTICS OF ISOLATE GA IN CHICKENS. (E.) Eidson, C. S. (U. Georgia, Athens) and S. C. Schmittle. Avian Dis. 12(3): 467-476, 1968.

A strain of acute Marek's disease (MD), found in Georgia and identified as GA isolate, was passed in 1-day-old chicks at 2-4-wk. intervals for 45 passages over a 3-yr. period, using tumor suspensions or plasma as the inoculum. Progeny from 3 different heavy-breed flocks were used. Both plasma and tumor suspensions induced a consistently high incidence of MD lesions; chickens inoc. with the tumor suspension showed a higher mortality. Visceral tumors were produced in 1-4 wk. Nerve enlargement and paralysis were seen in older birds. Most of the birds (73-90%) died by 2 wk. of age (median 9-10 days after inoc.). (E. L. Stubbs)

69-821 STUDIES ON ACUTE MAREK'S DISEASE. III. LESION VERSUS NONLESION DONOR BIRDS. (E.) Eidson, C. S. (U. Georgia, Athens), S. C. Schmittle and M. S. Silberman. Avian Dis. 12(3):543-548, 1968.

The GA isolate of Marek's disease was inj. into 1-day-old chicks, which were used as donors of plasma at age 4-5 wk. to demonstrate the infectivity of plasma. The donors were grouped according to the stage of Marek's disease: 1. (with gross lesions), 2. (with microscopic lesions only), and 3. (with no lesions). The response of the chicks to graded doses of plasma was similar with each donor, regardless of the stage of disease. (E. L. Stubbs)

69-822 STUDIES ON ACUTE MAREK'S DISEASE. V. ATTEMPTED TRANSMISSION OF ISOLATE GA

WITH FECES AND NASAL WASHINGS. (E.) Eidson, C. S. (U. Georgia, Athens) and S. C. Schmittle. Avian Dis. 12(3):549-553, 1968.

The GA isolate of Marek's disease was transmitted in nasal washings from 3-wk.-old-donor birds to 1-day-old chicks. The data suggest that infectivity could be removed from nasal washings by centrifuging for 10 min. at 2000 g. Feces taken directly from GA-infected birds were not infective to 1-day-old chicks. Fecal droppings collected from GA-infected birds, placed in direct contact with 1-day-old-chicks, did not induce Marek's disease. (E. L. Stubbs)

69-823 MAREK'S DISEASE III. IMMUNOFLUORESCENT STUDIES. (E.) Kottaridis, S. D. (U. Connecticut, Storrs) and R. E. Luginbuhl. Avian Dis. 12(3):383-393, 1968.

A fluorescent antibody procedure is described to examine cell cultures and bone marrow smears for detection of the Marek's disease agent. Rabbits inj. with blood from chickens infected with Marek's disease produced an antiserum that showed a specific reaction with infected cell cultures and bone marrow smears. Lack of reaction in control samples and the failure of "normal" antiserum to stain infected cells indicated a specificity between the antigens used for the infection of cells and the immunization of rabbits. (E. L. Stubbs)

69-824 MAREK'S DISEASE IV. ANTIGENIC COMPONENTS DEMONSTRATED BY THE IMMUNODIFFUSION TEST. (E.) Kottaridis, S. D. (U. Connecticut, Storrs), R. E. Luginbuhl and T. W. Chomiak. Avian Dis. 12(3):394-401, 1968.

The Conn-A isolate of Marek's disease was used for antigenic studies by the immunodiffusion test. Plasma and bone marrow from chickens with Marek's disease produced double bands when tested by the agar-gel precipitin test using specific antisera. Antigens from control birds produced single precipitin bands with the same antisera. Fluorescent antibody tests correlated with the agar-gel precipitin tests. The appearance of an extra precipitin line in wells containing infected material suggested the presence of an antigen formed due to infection. (E. L. Stubbs)

69-825 INDUCTION OF CELLULAR DNA SYNTHESIS IN CHICK EMBRYO FIBROBLASTS INFECTED WITH ROUS SARCOMA VIRUS IN CULTURE. (E.) Kara, J. (Czech. Acad. Sci., Prague). Biochem. Biophys. Res. Commun. 32(5):817-824, 1968.

Cellular DNA synthesis was induced in chick embryo fibroblasts in culture by infection with Rous sarcoma virus. It is suggested that this ability to induce DNA synthesis by a RNA-containing virus is a necessary prologue to malignant transformation.

69-826 PHYSICAL PROPERTIES OF ROUS SARCOMA VIRUS RNA. (E.) Duesberg, P. H. (U. California, Berkeley). Proc. Nat. Acad. Sci. USA 60(4):1511-1518, 1968.

The 62S RNA of Rous sarcoma virus (RSV) was identified as an aggregate containing several RNA's, 1 major 36S species (molecular wt. 3.0 x 10^6) and some minor heterogeneous RNA's. Such aggregates were not unique among viral and cellular DNA's. Experiments indicated the presence of an RSV RNA-like aggregate in mouse leukemia virus. (A. O. Deeney)

69-827 IMMUNOFLUORESCENCE STUDIES OF SHOPE PAPILLOMA VIRUS IN COTTONTAIL RABBIT KIDNEY TISSUE CULTURES. (E.) Osato, T. (Aichi Cancer Ctr., Nagoya, Japan) and Y. Ito. Proc. Soc. Exp. Biol. Med. 128(4):1025-1029, 1968.

In secondary cottontail rabbit kidney (CRK) cultures infected with Shope papilloma virus (SPV; 100 ID_{100}/0.1 ml in rabbit skin tests) at 37° C, specific immunofluorescence appeared after 8 days, increasing to involve about 60% of the cells by 12 days. Throughout the 20-day period, all immunofluorescence remained in the nucleus (the nucleoli were not stained). No gross CPE appeared. Immunofluorescence rapidly disappeared from the cells with each later transfer at 37° C (none was seen in passage 6). When the temperature was reduced to 30° C the fluorescence reappeared rapidly, but it was confined to the cytoplasm. It is suggested that the SPV genome persists in the CRK cells even after the viral antigen disappears. The mechanism(s) by which a reduced temperature apparently provided a favorable condition for the functional expression of the "marked" SPV genome and later viral antigen synthesis, and the reasons for the change from intranuclear to intracytoplasmic antigen localization with a reduction in temperature, could not be determined.

69-828 EFFECTS OF HYDROXYUREA ON POLYOMA VIRUS REPLICATION. (E.) Nordenskjöld, B. A. (Karolinska Inst., Stockholm, Sweden) and I. H. Krakoff. Cancer Res. 28(9):1686-1691, 1968.

Hydroxyurea (HU; 10^{-4} or 10^{-3} M) completely inhibited the proliferation of secondary mouse embryo cells (6 x 10^4 cells/ml); the effect was irreversible when fresh medium was supplied after 4 days of exposure. At 10^{-5} M, HU doubled the cell doubling time (compared to untreated cultures). Primary mouse kidney cells were more resistant; they were not affected by HU at 10^{-5} M, but partial and almost complete inhibition of proliferation were seen at 10^{-4} and 10^{-3} M, resp. At a high HU conc. (10^{-2} M), the amount of infective polyoma virus (PV) released by mouse embryo cells into the medium was only approx. 1 log U less than in untreated cultures. At 10^{-4} M, no significant change in DNA synthesis was seen in infected cultures, but uninfected cultures showed 90% inhibition of DNA synthesis. The number of cells infected by PV was markedly decreased in HU-treated cultures. In treated control cultures, hemagglutinin production paralleled infective virus production. These results argue strongly against the hypothesis that HU preferentially inhibits virus DNA synthesis, while interfering with the formation of viral capsid protein to a lesser degree. On the contrary, they indicate that viral DNA and viral capsid synthesis are linked together very closely in the PV system, and that the decreased virus output in HU-treated cultures is not a result of decreased virus formation, but rather of a decrease in the fraction of PV-synthesizing cells.

69-829 EVIDENCE SUGGESTING A RELATIONSHIP BETWEEN POLYOMA VIRUS-INDUCED TRANSPLANTATION ANTIGEN AND NORMAL EMBRYONIC ANTIGEN. (E.) Pearson, G. (Stanford U., Calif.) and G. Freeman. Cancer Res. 28(9):1665-1673, 1968.

An antigen was detected in PTF cells, but not in STF cells, by rejection tests in PV-immunized adult Syrian golden hamsters and by in vitro cytotoxicity tests with STF-adsorbed rabbit anti-PTF serum. The PTF antigen was apparently a PV-associated cellular "tumor" antigen (PYV-ITA); it was also demonstrated in normal hamster embryo cells, but not in adult hamster spleen cells or in PV-transformed mouse embryo (3T3) cells. PYV-ITA, which may have been partially determined by an embryonic cellular gene, may be closely related to antigens existing in normal embryo cells but not in the normal adult hamster or in STF cells. It is hypothesized that PV-associated new cell antigens are not essential facets of transformation but may induce immunity against surface antigen-containing cells, and that PV may not be critical for tumor growth but increases the possibility of transformation.

69-830 THE INTEGRATED STATE OF VIRAL DNA IN SV40-TRANSFORMED CELLS. (E.) Sambrook, J. (Salk Inst. Biol. Studies, San Diego, Calif.), P. R. Srinivasan and R. Dulbecco. Proc. Nat. Acad. Sci. USA 60(4):1288-1295, 1968.

DNA preparations isolated from SV 3T3 and Py 3T3 cells were hybridized with RNA made in vitro with SV40 DNA as template. The degree of hybridization of SV 3T3 DNA, compared to that of Py 3T3 DNA, was equivalent to 20 SV40 genomes/cell. These studies eliminated the possibility that viral DNA in SV 3T3 cells is in the form of supercoiled circles of any size, and that it is in a free form of any configuration of molecular wt. comparable to the DNA of the virion. (A. O. Deeney)

69-831 ACTIVATION OF INFECTIOUS SV40 DNA SYNTHESIS IN TRANSFORMED CELLS. (E.) Kit, S. (Baylor U. Coll. Med., Houston, Tex.), M. R. Salvi and D. R. Dubbs. Proc. Nat. Acad. Sci. USA 60(4):1239-1246, 1968.

Infectious SV40 DNA was readily detected when extracts were prepared from 10^8 AGMK (CV-1) cells productively infected with SV40 at input multiplicities from 0.001-10 PFU/cell, or from SV40 infected CV-1 and transformed cells mixed in a ratio of 1:1000. Extracts of 10^8 transformed mouse or hamster cells did not yield infectious SV40 DNA or virus. However, infectious DNA and virus were recovered if the CV-1 transformed cell mixture was treated with UV-inactivated Sendai virus. Addition of inhibitors of DNA synthesis (cytosine arabinoside or 5-bromo-2'-deoxyuridine) to the culture at the time of fusion prevented infectious DNA synthesis. (A. O. Deeney)

69-832 ENHANCEMENT OF THE INFECTIVITY OF SIMIAN VIRUS 40 DEOXYRIBONUCLEIC ACID WITH DIETHYLAMINOETHYL-DEXTRAN. (E.) McCutchan, J. H. (U. North Carolina, Chapel Hill) and J. S. Pagano. J. Nat. Cancer Inst. 41(2):351-357, 1968.

The demonstration of an enhancing effect of diethylaminoethyl-dextran (DEAE-D) for the infectious DNA of SV40 enabled the development of a sensitive plaque assay for infectious viral DNA. Infectivity was directly related to the molecular wt. of DEAE-D. Paradoxically, DEAE-D caused a 20-fold reduction in infectivity of intact SV40. It was possible to prepare SV40 DNA with an infectivity titer high enough to initiate synchronous infection of all the cells in a culture. (E. Y. Lasfargues)

69-833 RESCUE OF INFECTIOUS SV40 AFTER FUSION BETWEEN DIFFERENT SV40-TRANSFORMED CELLS. (E.) Knowles, B. B. (Wistar Inst. Anat. Biol., Philadelphia, Pa.), F. C. Jensen, Z. Steplewski and H. Koprowski. Proc. Nat. Acad. Sci. USA 61(1):42-45, 1968.

Cells of some SV40-transformed cultures did not yield virus after fusion with susceptible AGMK cells in the presence of Sendai virus. When cells from SV40-transformed cultures were fused with cells of another of these cultures, SV40 was rescued either by recombination or by complementation. (A. O. Deeney)

69-834 INVESTIGATION OF MALIGNANT TRANSFORMATION OF HAMSTER KIDNEY CELLS IN VITRO BY SIMIAN VIRUS SV-40. (Ger.) Seemayer, N. (U. Freiburg i. Br., Germany). Z. Krebsforsch. 71(2):186-197, 1968.

In kidney cell cultures from 3-4-mo.-old Syrian golden hamsters, infection with SV40 (strains 777 or B-6) was followed by 4 clearly distinguishable stages of response. During the first stage, which lasted until 3 wk. after inoc., there were no significant changes except the appearance of a very few, isolated, polynucleated giant cells. During the second stage (3-5 wk. after inoc.), small islands of double-refracting (apparently diploid) cells appeared, with a frequency of 1-5 "islands"/10^6 cells. An appreciable increase of the number and size of nucleoli was evident in these "island" cells, as was a significant increase of cytoplasmic RNA. During the next stage (5-8 wk. after inoc.), tri- and multipolar mitoses appeared suddenly in these "island" cells, cytoplasmic RNA and nuclear chromatin markedly increased; the number of nucleoli also increased and many nucleoli were markedly enlarged and irregularly shaped. Many of the cell islands (1-2 x 10^3/island) were large enough to be visible to the naked eye, consisting of polymorphous spindle cells showing a "criss-cross" growth pattern and interspersed with polynucleated giant cells, some of which showed fused nuclei. SV40-specific T antigens were demonstrable in the nuclei of both cell types and the number of DNA-synthesizing cells was greatly increased. During the last stage (8-11 wk. after inoc.), large numbers of the "island" cells were suddenly transformed into typical *in vitro* carcinoma cells, which tended to group together, surrounded by a corona of typical spindle sarcoma cells, with occasional polynucleated giant cells separating the 2 tumor cell types. SV40-specific T antigens and markedly increased DNA metabolism was demonstrable in all of these cell types. The transformed cells were readily subcultivated, yielding a number of malignant cell lines by successive passages; inoc. of transformed cells from Stages 3 and 4 readily induced lethal tumors in unconditioned golden hamsters.

69-835 CRYOSURGICAL TREATMENT OF PRIMARY SV40 VIRAL AND ADENOVIRUS 7 TRANSPLANT TUMORS IN HAMSTERS. (E.) Larson, V. M. (Merck Inst. Ther. Res., West Point, Pa.), W. R. Clark and M. R. Hilleman. *Proc. Soc. Exp. Biol. Med.* 128(4):983-988, 1968.

In pregnant or young adult golden Syrian hamsters (from a closed random-bred colony) with tumors induced by passage 5 of SV40 (strain VA 45-54) or with transplants of the adenovirus type 7 (Pinckney strain)-induced C1-HT tumor, the tumor responses to cryosurgery were temporary and palliative at best in most animals. Treated C1-HT tumors of 2 animals regressed completely after cryosurgery, but similar regression of an untreated tumor was seen in 1 animal. The immunodestructive effect of cryosurgery was weak or absent.

69-836 PREVENTION OF VIRAL AND TRANSPLANT TUMORS IN HAMSTERS EMPLOYING KILLED AND FRAGMENTED HOMOLOGOUS TUMOR CELL VACCINES. (E.) Panteleakis, P. N. (Merck Inst. Ther. Res., West Point, Pa.), V. M. Larson, E. S. Glenn and M. R. Hilleman. *Proc. Soc. Exp. Biol. Med.* 129(1):50-57, 1968.

Methods for the isolation of tumor-specific transplant antigens were studied in several experiments in 2 Syrian golden hamster systems: newborn animals admin. SV40 strain VA 45-54 (0.2 ml s.c.; $10^{7.6}$ TCID_{50}/0.1 ml), followed by homologous SV40-free tumor vaccine (1.0 ml i.p.) at age 21 days; or male hamsters admin. the vaccine (1.0 ml i.p.) beginning at age 4-5 wk., followed by s.c. challenge with cells from the SV40-induced F5-1 tumor or the adenovirus 7-induced C1 tumor (both were free of infectious SV40 virus and contained specific tumor T antigens). The SV40-induced tumor cells lost their host immunizing activities after formalin treatment or disruption by nitrogen decompression or a French pressure cell. These treatments and freeze-thaw disruption, however, did not affect the ability of the adenovirus 7-induced tumor cells to immunize the hosts against the same challenge. Possible applications of these methods for the preparation of autochthonous human tumor vaccines are discussed.

69-837 PERSISTENCE OF SV40 VIRUS IN TRANSFORMED RABBIT KIDNEY CELLS. (E.) Schell, K. (Dow Chem. Co., Zionsville, Ind.). *Proc. Soc. Exp. Biol. Med.* 128(4):1145-1148, 1968.

The high-passage RKTr strain of SV40 (strain #776)-transformed rabbit kidney cells continued to release SV40 into the medium after plating on monolayer feeder cultures of African green monkey kidney cells (AGMK and its derivative BSC-1). The proportion of RKTr cells releasing SV40 at any given time was small, but each transformed cell or its progeny released SV40 at some time on prolonged contact with the susceptible cells. These experimental conditions did not favor an effective level of free infectious viral DNA, but the results suggested that each transformed cell carried the information for the complete SV40 virus in its repressed, non-infectious state.

69-838 GENETIC TRANSMISSION OF MAMMARY TUMOR VIRUSES IN MICE; POSSIBLE IMPLICATIONS FOR MURINE LEUKEMIA. (E.) Bentvelzen, P. (Netherlands Cancer Inst., Amsterdam), A. Timmermans, J. H. Daams and A. van der Gugten. *Bibl. Haemat.* 30:101-103, 1968.

The transmission of mammary tumor virus (MTV) or nodule-inducing virus (NIV) in certain strains of mice is discussed. Single Mendelian dominant factors, allelic to each other, apparently control several types of virus behavior: the extreme susceptibility of GR mice to the Mühlbock strain of MTV (M-MTV) but not to Bittner MTV (B-MTV); NIV transmission by ova and sperm in

C3Hf and DBAf mice (the factor does not cause male transmission of M-MTV); and repression of NIV release in C3Hf or DBAf hybrids with O_{20} or C57BL mice (but not BALB/c hybrids), which is repressed by irradiation or (in C57BL mice) several chemical carinogens. C57BL and O_{20} mice are markedly resistant to NIV, B-MTV and M-MTV replication. The resistance of the O_{20} mammary gland to B-MTV and NIV is caused by a factor allelic to the provirus seen in GR mice. These data are compared to those of similar studies (previously reported) of the genetic transmission of some mouse leukemia viruses.

69-839 MATERNAL FACTOR IN THE "HYBRID EFFECT" GIVEN BY A SPONTANEOUS MAMMARY CARCINOMA OF C3H MICE. (E.) Oth, D. (U. Nancy, France), M. Leclere, G. Grignon and C. Burg. Life Sci. 7(12, Part II):599-603, 1968.

The TM3 mammary tumor, arising spontaneously in a female mouse of the mammary tumor virus (MTV)-positive C3H/He strain and passaged for 4-7 generations in C3H/He females, was inoc. s.c. into recipients of 4 mouse strains: C3H/He (Group I); (C3H/He female x Swiss B male)F_1 hybrids (Group II); (Swiss B female x C3H/He male)F_1 hybrids (Group III); or (Swiss B female x C3H/He male)F_1 hybrids foster-nursed for 3 wk. by a C3H/He female (Group IV). Tumor take (studied for up to 250 days after tumor inoc.) was 89% in Group I (23/27 females, 9/9 males) and 97% in Group II (18/18 males, 43/45 females); it fell to 25% in Group III (4/11 males, 6/29 females), but this resistance was overcome by foster-nursing in Group IV (100%; all females). The "hybrid effect" ("hybrid hyperreactivity") seen in Group III was interpreted as an innate resistance to tumor-specific antigen(s) contained in the TM3 tumor. The absence of this effect in hybrids of Groups II and IV was explained by neonatal exposure to MTV from the milk in both groups, lending support to the assumption that the antigen(s) of the MTV and the TM3 tumor are closely related.

69-840 ROLE OF THE MAMMARY TUMOR VIRUS IN THE IMMUNOGENICITY OF SPONTANEOUS MAMMARY CARCINOMAS OF BALB/c MICE AND IN THE RESPONSIVENESS OF THE HOSTS. (E.) Dezfulian, M. (U. California, Berkeley), T. Zee, K. B. DeOme, P. B. Blair and D. W. Weiss. Cancer Res. 28(9):1759-1772, 1968.

Host and tumor immunity was studied in young adult mice (both sexes) of 2 isogenic strains: mammary tumor virus (MTV)-free BALB/cCrgl and MTV-positive BALB/cfC3HCrgl. The tumors were transplanted mammary carcinomas: 4 spontaneous MTV-positive tumors from BALB/cfC3H mice and 5 tumors from BALB/c females (1 spontaneous, 2 arising from hyperplastic alveolar nodules from methylcholanthrene-treated mice, 2 from mice with pituitary isografts). Preparations of whole blood or normal lactating mammary tissue from BALB/cfC3H mice immunized BALB/c mice against transplanted BALB/cfC3H tumors. Untreated normal BALB/c mice were more resistant than MTV-positive BALB/cfC3H mice to first-set grafts of the BALB/cfC3H tumors. This resistance was abolished by foster-nursing of BALB/c mice by BALB/cfC3H females. Sera from BALB/c mice immunized with milk from BALB/cfC3H mice (but not from BALB/c mice) enhanced the susceptibility of normal BALB/c mice to the tumor isografts. The reaction of BALB/c mice to unrelated antigens or the BALB/c mammary tumors was not affected by neonatal MTV infection. It is suggested that MTV determines or controls at least part of the unique antigenicity of spontaneous mouse mammary tumors.

69-841 THE DEOXYRIBONUCLEIC ACID NUCLEOTIDYLTRANSFERASE ACTIVITIES OF THE SHOPE FIBROMA. PARTIAL PURIFICATION AND KINETICS. (E.) Chang, L. M. S. (Indiana U. Med. Ctr., Indianapolis) and M. E. Hodes. J. Biol. Chem. 243(20):5337-5344, 1968.

69-842 THE PRESENT STATUS OF CHROMOSOME STUDIES IN BOVINE LEUKOSIS (LEUKEMIA). (E.) Hare, W. C. D. (U. Pennsylvania, Philadelphia) and R. A. McFeely. Bibl. Haemat. 30:231-233, 1968.

69-843 CORRELATIVE BIOLOGICAL AND ULTRASTRUCTURAL STUDIES ON ROUS SARCOMA VIRUS IN VARIOUS HOSTS. (E.) Rabotti, G. F. (Coll. France, Paris) and F. Haguenau. Bibl. Haemat. 30:31-33, 1968.

69-844 THE EFFECT OF INTERFERON PREPARATIONS ON FRIEND LEUKEMIA OF MICE. (E.) Gresser, I. (Inst. Sci. Res. Cancer, Villejuif/Seine, France). Bibl. Haemat. 30:37-39, 1968.

69-845 ROLE OF IMMUNOLOGICAL TOLERANCE IN VIRAL LEUKEMOGENESIS OF THE MOUSE. (E.) Chieco-Bianchi, L. (U. Padua, Italy), G. Tridente, N. Pennelli and L. Fiore-Donati. Bibl. Haemat. 30:40-42, 1968.

69-846 ON THE STRUCTURE OF THE LEUKEMIA VIRUSES. (E.) De-Thé, G. (Int. Cancer Res. Ctr., Lyon, France). Bibl. Haemat. 30:54-56, 1968.

69-847 MULTIPLICITY OF CELL RESPONSE TO A MURINE ERYTHROBLASTOSIS VIRUS. (E.) Kirsten, W. H. (U. Chicago, Ill.), K. D. Somers and L. A. Mayer. Bibl. Haemat. 30:64-65, 1968.

69-848 STUDIES ON VIRUS ATTENUATION IN MOUSE LEUKEMIA. (E.) Sinkovics, J. G. (U. Texas M. D. Anderson Hosp., Houston), C. D. Howe and C. C. Shullenberger. Bibl. Haemat. 30:73-75, 1968.

69-849 VARIABILITY OF LEUKEMOGENIC POTENTIAL OF RAUSCHER VIRUS IN CULTURE. (E.) Barski, G. (Gustave-Roussy Inst., Villejuif, France), J. K. Youn and D. Barbieri. Bibl. Haemat. 30:76-77, 1968.

69-850 BIOLOGICAL AND PHYSICAL PROPERTIES OF A LEUKEMOGENIC AGENT OF A NEW TYPE OF VIRAL MURINE LEUKEMIA. (E.) Libánský, J. (Inst. Hemat. Blood Trans., Prague), O. Mach and O. Novotná. Bibl. Haemat. 30:78-80, 1968.

69-851 QUANTITATIVE ASSAY OF MOLONEY LEUKEMIA VIRUS AND RAUSCHER LEUKEMIA VIRUS BY IMMUNOFLUORESCENCE IN CELL CULTURE. (E.) Pinkel, D. (U. Tennessee, Memphis) and K. Yoshida. Bibl. Haemat. 30:89-91, 1968.

69-852 STUDIES ON THE PRODUCTION OF RAUSCHER LEUKEMIA IMMUNITY IN BALB/c MICE. (E.) Gelzer, J. (CIBA Ltd., Basel, Switzerland). Bibl. Haemat. 30:97-98, 1968.

69-853 VARIATIONS IN LIVER CATALASE ACTIVITY IN MICE CAUSED BY TUMOROUS AND NON-TUMOROUS FACTORS -- ITS RELATIONSHIP TO THE ACTIVITY OF THE RETICULOENDOTHELIAL SYSTEM. (E.) Lamensans, A. (Inst. Pasteur, Paris), G. Biozzi, C. Stiffel and M. F. Mollier. Bibl. Haemat. 30:99-100, 1968.

See also abstract nos.: 678,684,685,686,687,691,692,693,695,712,864

69-854 OVER-ALL CANCER INCIDENCE AND AGE DISTRIBUTION OF TUMORS OF VARIOUS ORGANS IN DÜSSELDORF FROM 1908 TO 1964. (Ger.) Poche, R. (U. Düsseldorf, Germany) and U. Hoffmann. Ergebn. Allg. Path. 50:26-62, 1968.

Cancer morbidity and mortality rates in adults (over 14) in Düsseldorf from 1908-1936 and from 1946-1963 (with a few lapses including the war years) were compared. The autopsy series in 1908-1936 (Group I) included 4171 men and 2750 women; the 1946-1963 series (Group II) included 7572 men and 4913 women. The total cancer morbidity in men increased from 17.0% in Group I to 21.7% in Group II (20.3% and 27.7%, resp., in the autopsy series). In women, the total cancer incidence increased from 19.3% to 23.8% (19.8% to 25.8% in the autopsy series). In both men and women, the max. age incidence decreased; in Group I, the max. incidence was at 60-69 and 50-59 yr. in men and women, resp., compared to 50-59 and 40-49, resp., in Group II. Significant time changes in the incidence of individual tumors included increases in bronchial cancer (both sexes, but especially men) and female genital cancer (including breast cancer) and decreases in cancer of the stomach (both sexes), esophagus and rectum (men) and gallbladder (women). In some disease categories, the tumor incidence increased and the age incidence decreased (suggesting the participation of exogenous factors); in other cases, the age incidence remained unchanged while the tumor incidence changed (suggesting participation by endogenous factors).

69-855 EVALUATION OF REGISTRATION OF MALIGNANT TUMORS IN THE REGION OF CRACOW. (Pol.) Kołodziejska, H. (Cancer Inst., Cracow, Poland). Nowotwory 18(3):287-293, 1968.

Cancer morbidity rates/100,000, analyzed on the basis of registration of new cases in 1965 and 1966, increased from 137.52 to 156.70 in men and from 131.00 to 149.38 in women during this 2-yr. period; the absolute numbers rose from 1759 to 2025 in men and from 1793 to 2025 in women. When subdivided for place of residence, the morbidity rate in the city of Cracow decreased from 193.61 to 185.70; in the towns and suburbs it increased from 131.33 to 164.71 and in the villages it increased from 114.87 to 136.63. The 1966 morbidity rates in these areas were 168.97 (males) and 201.06 (females), 164.95 (males) and 164.48 (females) and 149.10 (males) and 124.88 (females), resp. The incidence/100,000 in 1966 of different neoplasms in males was: stomach 37.30; lung and trachea 28.40; skin 10.76; bladder 8.82; lip 6.65; larynx 5.96; leukemia 5.26; prostate 4.88; and large intestine 4.10. In women the incidence was: cervix 22.73; breast 20.34; stomach 20.34; skin 14.19; ovary 7.31; uterus 6.08; large intestine 4.92; lung and trachea 4.85; bile ducts 4.34; leukemia 4.05. The diagnosis was confirmed histologically in 51% and by other methods in 24%; in 25% of registration cards no information as to the basis for diagnosis was given. The reported morbidity in rates in individual districts of the Cracow region in 1966 was apparently subject to errors due to unsatisfactory registration. This was especially noticeable in 2 neighboring districts, Nowy Targ and Zakopane, with almost identical geophysical characteristics and reported morbidity rates of 109.29 and 211.36, resp.

69-856 INCIDENCE OF PRIMARY CARCINOMA OF THE LIVER IN THE WEST OF SCOTLAND BETWEEN 1949 AND 1965. (E.) Manderson, W. G. (Royal Infirm., Glasgow, Scotland), R. S. Patrick and E. E. Peters. Gut 9(4):480-484, 1968.

The incidence of primary cancer and cirrhosis of the liver was studied in pts. autopsied at the Glasgow Royal Infirmary (G.R.I.) and 12 other hospitals in Glasgow and the west of Scotland (including most of the hospital population of this area) from 1949-1965. At G.R.I. and the other hospitals, the liver cancer incidence in 1949-1958 was 0.366% and 0.327% (16/4331 and 80/21,827), resp. Beginning in 1959, this incidence rose markedly and continuously at G.R.I. (40/3186) = 1.264% in 1959-1965); in the other hospitals the increase was much smaller (to 0.537% = 138/25,974 in 1959-1965). The G.R.I. series included 4 cholangiocarcinomas, 4 mixed tumors (hepatocellular + cholangiocarcinoma) and 2 hemangioblastomas; the other tumors were hepatocellular carcinomas. Cirrhosis, usually of the coarse multilobular type, was present in about 75% of the G.R.I. pts. with liver cancer, but the recent increase in the liver cancer incidence involved both cirrhotic and non-cirrhotic forms. Other possible contributory factors in the G.R.I. series included viral hepatitis (5 pts.), treatment of syphilis (5 pts.), alcoholism (12 pts.), severe malnutrition (1 pt.) and idiopathic hemochromatosis (11 pts.). The increase in liver cancer at G.R.I. was not accompanied by an increase in liver cirrhosis (3.133% in 1949-1958, 3.289% in 1959-1965); in the other hospitals, the cirrhosis incidence showed a slight, probably insignificant decrease (1.916% to 1.693%), even though the number of pts. with alcoholic liver disease in the west of Scotland has increased in the last 10 yr. (no other details). No explanation for this increase in liver cancer at G.R.I. could be given.

69-857 FROM HEPATITIS TO LIVER CANCER: CONSIDERATIONS ON ONSET, CLINICAL COURSE AND AUTOPSY FINDINGS. (Jap.) Kojo, Y. (Yokohama Nat. Hosp., Japan), T. Fujisawa, I. Takahashi, K. Kazama, K. Maruyama, A. Hirukawa, T. Higuchi and T. Ono. Iryo 22(3):302-315, 1968.

Liver diseases (excluding carcinogenic or purulent diseases) were seen in 6.7% of all pts. admitted to the Department of Internal Medicine (Yokohama National Hospital) from 1945-1965; hepatitis was seen in 4.6% (168 pts.), cirrhosis in 1.6% and liver tumors in 0.4% (number of pts. not stated). By comparison, the incidence of liver diseases, hepatitis, cirrhosis and liver cancer in Japan as a whole was 1.2%, 0.9%, 0.2% and about 0%, resp. The incidence of liver cirrhosis and liver cancer in autopsy cases from the authors' department (total number of pts. not stated) was 9.2% (22 pts.) and 4.5%, resp., compared to 12% and 0.85%, resp., in Asia and 1.6-9.0% and 0.13%, resp., in America and Europe. Liver cancer was seen in 24% of the authors' autopsied pts. with cirrhosis (compared to 26.29% in Asia and 1.5-6% in America and Europe); cirrhosis was seen in 54% of the authors' autopsy cases of liver cancer (compared to 50-60% in Asia and 87% in America and Europe).

69-858 CARCINOMA OF THE CERVICAL STUMP. (Ger.) Schilling, H. (Carus Med. Acad., Dresden, Germany). Zbl. Gynaek. 90(37):1248-1256, 1968.

From 1948-1966, 2760 women with cervix cancer and 44 women (1.59%) with cancer of the cervical stump (excluding Stage 0 pts., 28/44 Stage I-II, 12/44 Stage III, 4/44 Stage IV) were seen. Epithelial atypia of the cervical stump was noted in 15 additional pts. "Pseudocervical" stump cancer was seen in 4 pts. (4/4 developed cancer within 1 yr. of uterine amputation) and true cervical stump cancer in 40/44; the time between uterine amputation and the diagnosis of cervical stump cancer in these 40 pts. was 3-38 yr. (over 10 yr. in 23/40). The age at diagnosis was 37-75 yr. (mean 56.9 yr.); 7/44 were nulliparas, 8/44 had 1 child, 29/44 had 2-8 children and the av. number of abortions was 1.7 (range 0-7). No conclusions as to the effects of parity could be made. The reasons for supravaginal uterine amputation were myoma in 19 pts., unspecified growths in 7 pts., menorrhagia in 4 pts. and unknown in the rest of the group. Total uterine amputation is recommended in preference to supravaginal amputation.

69-859 CARCINOMA OF THE PENIS IN SOUTHERN INDIA. (E.) Thomas, J. A. (St. John's Med. Coll., Bangalore, India) and C. S. Small. J. Urol. (Baltimore) 100(4):520-526, 1968.

Of 10,034 pts. with cancer seen at the Christian Medical College Hospital (Vellore, India) from 1953-1962, 200 (2%) had cancer of the penis; 190 tumors were identified histologically as squamous cell carcinomas, the other 10 were excluded from the group because the diagnosis was not histologically confirmed. The age range in the 190 pts. with histologically confirmed penis carcinoma was 23-86 yr. (most were in the 41-50 yr. age group); 173 were Hindus, 13 were Christians, 1 was Moslem and the religion of 3 was not stated. All pts. were of Indian extraction. Although 40/190 had been circumcised (none at birth; only 3/40 over 10 yr. previously), 78/190 (41.1%) showed phimosis, which may have predisposed to the development of cancer because of insidious chronic inflammation from smegma and tissue debris. No conclusions as to racial or social predominance could be drawn. Other tumors encountered during the same 10-yr. period included carcinoma of the cervix uteri (1333 pts.), buccal mucosa (926), stomach (607) or esophagus (575) and lymphoma (407 pts.).

69-860 ATTEMPT TO EVALUATE THE INFLUENCE OF CERTAIN FACTORS ON THE OCCURRENCE OF BREAST CANCER AMONG WOMEN IN POLAND. (Pol.) Staszewski, J. (Cancer Inst., Gliwice, Poland). Nowotwory 18(3):295-302, 1968.

Age-adjusted breast cancer mortality rates/100,000 in 1961, computed for 17 districts and 5 metropolitan areas, were correlated with age-adjusted fertility rates/1000 females (age 15-49) in 1950-1951 and rates of early marriage (15-19 yr. old) in 1950. Breast cancer mortality was low in Poland; it was greatest in 5 large cities (Warsaw, Poznan, Lodz, Cracow and Wroclaw) and in 2 districts (Poznan and Katowice). Mortality was 2-3-fold higher in cities than in rural areas. A negative correlation between fertility (not defined) in 1950-1951 and breast cancer mortality in 1961 was found, especially in the large cities and the Katowice province, but in the province of Poznan both fertility and breast cancer mortality were high. The highest early marriage and fertility rates were noted in the northern and western districts, but these districts did not show a lower breast cancer mortality rate. There seemed to be no correlation between breast cancer mortality and early marriage (except in the northern and western districts). A positive correlation was found between breast and uterine cancer mortality rates (assumed to be cancer of the cervix in 75-80% of pts.); both mortality rates were high in the western and northern districts and low in the eastern and southern districts. It is suggested that the low mortality rates in the eastern and southern districts might be due to inaccurate diagnosis in these areas, since reported mortality from all neoplasms is low in these districts.

69-861 AN EPIDEMIOLOGIC STUDY OF CARCINOMA OF THE OVARY IN ISRAEL. (E.) Schenker, J. G. (Hebrew U.-Hadassah Med. Sch., Jerusalem, Israel), W. Z. Polishuk and R. Steinitz. Israel J. Med. Sci. 4(4):820-826, 1968.

Israel Cancer Registry data for 1960-1965 revealed 746 new cases of primary ovarian carcinoma, accounting for 5% of all new cancer cases in Israeli women over 15. Although the

Jewish population of Israel rose from 1.9 to 2.3 million from 1961-1965 (much of it from immigration), the annual ovarian cancer incidence remained constant (over-all 17.8/100,000 women over 15). The age range in these 746 pts. was 5-92 yr. (mean 53.8 yr.), over 60% were in the 45-64 age group and 33% in the 45-54 age group. The over-all incidence of ovarian cancer in Israeli Jews was 11.6 and 13.7/100,000, resp. (compared to 11.0-13.4 in Denmark, Sweden, Canada and Connecticut and 2.5-8.1 in Yugoslavia, the Netherlands, Puerto Rico, Japan or Chile). The ovarian cancer incidence in Israeli women of European or American birth was much higher than the incidence in women of Asian or African birth (22.8 and 7.2/100,000 women over 15, resp.), reflecting the difference in incidence between the European and African continents. The importance of routine examination of women in the 45-64 age group (especially those of European or American birth) is stressed, particularly since 62.7% of these 746 pts. had Stage IV disease at diagnosis.

69-862 MALIGNANT TUMORS OF THE UPPER RESPIRATORY TRACT IN CAMBODIA. (Rus.) Kozlov, M. Ia. (Khmer-Soviet Friendship Hosp., Phnom Penh, Cambodia) and V. D. Lazurkina. Zh. Ushn. Nos. Gorl. Bolez. 28(3):33-35, 1968.

Of 23,583 pts. admitted to the Khmer-Soviet Friendship Hospital (Phnom Penh) in 1960-1966, 2866 (12.1%) had cancer and 582 (20.3% of the cancer pts.; 395 men, 187 women) had tumors of the upper respiratory tract. Cancer of the larynx was seen in 128 pts. (100 men, 28 women), pharyngeal cancer in 149 (103 men, 46 women), cancer of the nasal and accessory nasal sinuses in 103 (68 men, 35 women) and other tumors (including borderline region tumors) in 202 pts. (124 men, 78 women); 29/582 were under 20, 233 were 21-50 yr. old and 320 were over 50. Most pts. had advanced disease (Stage III-IV in 472/582; 469/582 had metastases at admission). Upper respiratory tumors were the most frequent tumors in Cambodia; the incidence of larynx cancer was 4.6%, the highest in the world, compared to 3.29% for cancer of the nasal and accessory nasal sinuses (compared to 0.1% elsewhere) and 5.2% for cancer of the pharynx (compared to 1.7% elsewhere). The upper vestibular region of the larynx was the most frequent tumor site, and laryngopharyngeal tumors were also frequent. The high morbidity in women (31%) was attributed to betel chewing, opium smoking and other harmful customs. The high incidence of upper respiratory cancer in Cambodia was attributed to these customs and factors such as methods of food preparation, the high conc. of irritants in foods and pollution of the drinking water.

69-863 A STUDY OF 650 OBSERVED MALIGNANT MELANOMAS IN THE SOUTH-WEST REGION. (E.) Bodenham, D. C. (United Bristol Hosps., England). Ann. Roy. Coll. Surg. Eng. 43(4): 218-239, 1968.

Data on 650 melanoma pts. seen from 1948-1967 at a center treating most melanoma pts. from southwestern England (population 3 million) are reported. The over-all incidence was 3.5/100,000; the over-all female:male ratio was 2.5:1, increasing from 3.5:1 at the beginning of the period to 11:1 in 1967. In women, the melanoma incidence was 2.5/100,000 in the northern portion of the region and 10/100,000 in Cornwall. The most frequent tumor sites in the entire group were the leg (28.7%), face (28.2%), foot and ankle (11.6%), trunk (12.6%) and arm (6.8%); 92.7%, 65.1%, 62.5%, 50% and 71.4%, resp., were females. In Australia and the U.S. the distribution of melanoma over the body is more even and the sex ratio is closer to unity, which may reflect differences in climate and habits. The increase of melanoma involving the legs was particularly great in women during this 20-yr. period. It is suggested that this may reflect higher exposure to UV irradiation from wearing nylon stockings (which stop only about 25% of the UV rays). The prewar stockings offered more protection to the legs, and the increased incidence of melanoma of the legs in women corresponded in time to the increasing availability of nylon stockings.

69-864 LEUKEMIA IN CHILDREN EXPOSED TO MULTIPLE RISK FACTORS. (E.) Gibson, R. W. (Roswell Park Mem. Inst., Buffalo, N. Y.), I. D. J. Bross, S. Graham, A. M. Lilienfeld, L. M. Schuman, M. L. Levin and J. E. Dowd. New Eng. J. Med. 279(17):906-909, 1968.

Data on 319 children (under 15) with leukemia and 884 controls were obtained by interview in 1959-1962 to determine the leukemia risk associated with 2 radiation factors (RF; maternal irradiation before conception, or *in utero* irradiation of the child studied) and 2 pathological factors (PF; maternal histories of reproductive wastage before conception of the subject, or the subject's history of virus disease more than 12 mo. before the diagnosis of leukemia). Because of the preponderance of the 1-4 yr. age group in the children with leukemia (54.0%, compared to 27.3% of controls), this group was emphasized. The leukemia risk in this age group was set at 1.0 in the absence of any exposure. Exposure to a single RF or PF did not significantly increase the leukemia risk (1.01 and 1.13, resp.), nor did exposure to both RF or both PF (1.56 and 1.21, resp.). Exposure to 1 RF + 1 PF increased the risk significantly only if the RF was *in utero* irradiation and the PF was a history of reproductive wastage, but the error attached to this estimated risk (7.71) was high. Exposure to 1 PF + 2 RF or to 1 RF + 2 PF increased the risk significantly (2.69 and 3.36, resp.); exposure to all 4 factors increased the risk to 4.64. It is concluded that radiation exposure is important when considered in relation to exposures to the 2 PF, and that histories of exposure to PF are important only in the presence of a corresponding history of radiation exposure. The 2 RF may be viewed as triggering agents of a sequence of events increasing the risk of childhood leukemia.

69-865 AN APPROACH TO THE OCCURRENCE OF LEUKEMIA: AN APPLICATION OF POISSON DISTRIBUTION. (E.) Mokuno, J. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan), H. Nishiyama and T. Inoue. Gann 59(4):263-271, 1968.

Examination of death certificates from 1962-1965 (and follow-up through June, 1967 to find cases diagnosed in 1962-1965) for the Tokai district of central Japan (Aichi, Gifu and Mie Prefectures; 1965 population 8,013,485) yielded 903 cases of leukemia at all ages. The district was subdivided into 1108 temporospatial units for statistical analysis by the Poisson distribution method. Analysis of a sample of 59 geographical units with populations of 50,000 ± 10% showed a good correlation between observed and expected cases. Computer analysis of data from all 1108 districts showed some large-population areas with an increased leukemia incidence, but only 3 were regarded as true clusters. One of these was a 1.8 km^2 area in Nagoya (population 2276) with 10 cases of leukemia (8 acute myeloid, 1 chronic myeloid, 1 acute lymphatic; 4 males, 6 females, age 3-57 yr.) over a 2-yr. period; in these pts. the onset of symptoms was in the spring and summer (March through August). Another cluster was a small subunit in a large city (population 3638 and 102,395, resp.) with 3 cases of leukemia (2 acute, 1 chronic) over 1 yr. The third was an isolated area (population 1346) with 3 cases over 1 yr. and 4 cases in all (all acute leukemia) over the entire study period.

69-866 MALIGNANT LYMPHOMAS IN LEPROSY PATIENTS. A CLINICAL AND HISTOPATHOLOGIC STUDY. (E.) Rodriguez, E. (Ramos Mejia Hosp., Buenos Aires), Y. P. De Bonaparte, M. C. Morgenfeld and R. L. Cabrini. Int. J. Leprosy 36(2):203-212, 1968.

In the Sommer Colony (Buenos Aires Province), which has treated about 3000 leprosy pts. since 1942, 5 pts. with lymphoma were discovered and treated from 1958-1965 (during which time about 1200 pts. were in the colony). All pts. were adults, with leprosy of 10-22 yr. duration at the time of diagnosis (age 29-59 yr.); 1/5 had a family history of leprosy and 1/5 a personal history of erythema nodosum. The histological diagnosis was lymphoblastic lymphoma in 2/5, giant follicular lymphoma in 1/5 (a tumor rare in Argentina) and Hodgkin's disease in 2/5. One pt. responded well to antitumor therapy and died of leprosy 11 yr. later, autopsy showing no signs of active lymphoma; the other pts. showed moderate to no response to treatment and died 7 mo.-4 yr. after diagnosis, showing both active leprosy and active lymphoma. No changes in the course of the leprosy could be attributed to the lymphoma; delayed hypersensitivity reactions were not observed, and no lepromatous granulomas or Virchow-type histiocytic cells containing bacilli were seen in the tumor specimens. Another case of associated lymphoma and leprosy is reported, in a 70-yr.-old man not living in the leper colony; this pt. developed a lepromatous lesion after about 2 yr. of successful treatment for lymphoblastic lymphoma. Although the incidence of lymphoma in this leper colony seemed very high for a systemic disease not often associated with leprosy, no valid conclusions could be drawn. Histological examination of the lymph nodes in all leprosy pts. with lymphadenopathy is recommended.

69-867 SOME CORRELATION BETWEEN MORTALITY FROM CANCER AND TUBERCULOSIS IN PLOVDIV FOR THE YEARS 1946, 1956 AND 1965. (E.) Khadzhiev, S. (Pavlov Med. Inst., Plovdiv, Bulgaria), I. Kavaklieva-Dimitrova and T. Zakhariev. Folia Med. (Plovdiv) 9(6):386-389, 1967.

Examination of the death certificates for all adults over 25 in Plovdiv showed that the mortality from cancer (including Hodgkin's disease and leukemia) and tuberculosis combined remained relatively constant for 1946 (199/975 = 20.4%), 1956 (209/1041 = 20.0%) and 1965 (246/1191 = 20.7%). However, while the mortality from tuberculosis decreased (93, 40 and 19 cases = 9.5%, 3.8% and 1.7%, resp.), the cancer mortality increased (106, 169 and 227 cases = 10.9%, 16.2% and 19.0%, resp.). These data were not subdivided by age or sex. Possible interactions between cancer and tuberculosis are discussed.

69-868 SECONDARY CARDIAC TUMORS: CLINICAL AND PATHOLOGICAL MATERIAL. (Nor.) Hernes, D. (Gades Inst., Bergen, Norway) and H. Schjønsby. Nord. Med. 80(36):1187-1188, 1968.

Examination of autopsy records from the Gade Institute (Bergen, Norway) over 1957-1967 showed malignant tumors in 2054/8103 cases (25.3%); 70/2054 (3.4%) had cardiac metastases (42 pericardial, 23 myocardial) and 14/70 (20%) had shown cardiac symptoms clearly related to the autopsy findings. Apparently, all types of malignant tumors can give rise to cardiac metastases; the highest frequencies of cardiac metastases (including metastases of the pericardium) were seen in pts. with bronchial (22/190 = 11.4%), breast (15/143 = 10.4%) and esophageal carcinoma (5/28: this group was too small to establish an accurate frequency). Cardiac symptoms resulting from metastases were widely varied both clinically and by electrocardiogram (ECG), the most frequent being arrhythmia and pericardial diffusion. ECG abnormalities were present in 33 pts. but probably caused by heart metastases in only 7 (10%). Cardiac symptoms were more often associated with pericardial than myocardial metastases. Secondary cardiac tumors were diagnosed *in vivo* in only 4 pts. No metastases limited to the endocardium were observed in this autopsy series.

69-869 MORPHOLOGY AND INCIDENCE OF PRIMARY TUMORS OF THE NASAL CAVITY AND PARANASAL SINUSES IN DOGS AND CATS. (Ger.) Hänichen, T. (Inst. Vet. Path., U. Munich, Germany) and B. Schiefer. *Z. Krebsforsch.* 71(3):255-266, 1968.

Examination of biopsy and autopsy data from 1956-1967 records (Institute of Veterinary Pathology) showed tumors of the nasopharynx in 1 male and 2 female cats (1 each with adenocarcinoma, squamous cell carcinoma and osteosarcoma) and in 25/12,047 dogs. The histological diagnosis of the tumors in dogs was osteosarcoma (3), chondrosarcoma (4), other sarcomas (4), melanoma (1), adenocarcinoma (3), nonkeratinizing carcinoma (3), solid carcinoma (4) or transitional cell carcinoma (3); av. ages in dogs with mesenchymal and epithelial tumors were 7.6 and 8.9 yr., resp. Two of the dogs were females, 3 were of unknown sex and 20 were males. No significant breed distribution was noted (7 terriers, 4 sheep dogs, 3 schnauzers, 3 spaniels, 2 Spitzes, 2 dachshunds, 1 each boxer, chow, St. Bernard and poodle). There was no significant time difference in the incidence of mesenchymal tumors, but only 4/18 epithelial tumors were seen before 1964; 6 tumors (1 recurrent) were seen in 1965, 4 (2 recurrent) in 1966 and 1 (recurrent) in 1967. It is suggested that the peak incidence of epithelial tumors in dogs (1965) and the decreased incidence thereafter may reflect the very high level of atmospheric radioactivity seen in southern Germany in 1962 and the early part of 1963.

69-870 LYMPHOSARCOMA IN INDIAN BUFFALOES. (E.) Singh, C. M. (Indian Vet. Res. Inst., Izatnagar, U. P., India). *Bibl. Haemat.* 30:237-243, 1968.

Several unpublished studies by the author and colleagues are summarized (8 references). The incidence of lymphosarcoma in slaughtered Indian buffaloes increased with age (1.23% in young animals and 17.8% in adults in 1 study) and was higher in males than in females (12.2% and 5.7%, resp., in 1 study of aged animals). Some geographical variations were noted in data collected from several Indian slaughterhouses, but no conclusions are drawn. Unlike the lymphosarcoma of cattle reported in the American and European literature, the lymphosarcoma of Indian buffaloes predominantly involved the pleural, peritoneal and pericardial cavities; parenchymatous involvement was rare in the buffaloes (although invasion of the visceral surfaces of abdominal and pelvic organs was noted). Lymph node involvement resembled that seen in lymphosarcoma of cattle, but the greatest involvement was seen in the internal lymph nodes. Leukemic blood pictures were seen in some animals.

See also abstract nos.: 677,799,810,811,812,813,814,815,816,817

9-871 VARIATIONS IN THE INCIDENCE OF SEX CHROMATIN - A REAPPRAISAL. (E.) Levij, . S. (Hebrew U.-Hadassah Med. Sch., Jerusalem, Israel) and R. Carel. Acta Cytol. (Balt.) 12(5):352-356, 1968.

Examination of buccal epithelial smears from 20 ealthy young women showed a significant increase in av. nuclear area (67 μ^2) and a significant reduction in the incidence of peripheral sex chromatin particles (av. 24%) on days 8-10 of the menstrual cycle; on days 1-7 and 11-28, av. uclear area was 58-59 μ^2 and the av. peripheral sex chromatin particle content was 30-31%. An inverse relationship between nuclear size and the peripheral sex chromatin particle content as seen.

9-872 CHROMOSOMAL FEATURES AND DNA CONTENT OF YOSHIDA ASCITES SARCOMA AND ITS SLOW-ROWING VARIANTS CHARACTERIZED BY ISLAND FORMATION IN ASCITES. (E.) Isaka, H. (Sasaki Inst., Tokyo). ann 59(4):327-339, 1968.

arked biological and pathological changes were seen in Yoshida sarcoma (YS) cells after trans-lantation in immunologically conditioned Donryu rats; the cells formed clumps in the ascites fluid, resembling "ascites hepatoma islands," hich grew in alveolar or adenocarcinomatous atterns after serial transplantation. The ariants were less malignant than YS, and were iologically stable after repeated transplantation. The chromosomal morphology of the parent S and some of its variants was studied 4 days fter i.p. inoc. in Donryu rats (100 g). YS ad a modal chromosome number of 40; variants Y-52, LY-54 and LY-80 (each with 100% take and a mean survival time of 12-13 days, compared to days in rats with YS) had 42 chromosomes. The Y-80 and LY-54 variants showed similar karyotypes (with respect to the length and arm indices). The other variants showed a wide range of modal chromosome number: 54 in LY-5 (96% take, mean survival time 44 days), 55 in LY-6 (28% take, ean survival 40 days), 58 in LY-336 (77% take, ean survival 48 days), 59 in LY-7 (100% take, ean survival 19 days) and 66 in LY-1 (66% take, ean survival 45 days). Cellular DNA content as approx. parallel to the chromosome number.

9-873 ELEVEN CASES OF A PRECISE MODEL OF KARYOTYPIC EVOLUTION IN CHRONIC MYELOID LEUKEMIA. (Fr.) De Grouchy, J. (Hosp. Children's Dis., Paris), C. De Nava, J. Feingold, G. Bilski-Pasquier and J. Bousser. Europ. J. Cancer 4(5)481-492, 1968.

A Ph^1-positive clone, with deletion of 1 chromosome of the 17-18 group (probably #17) and a mediocentric marker chromosome the size of a Group C chromosome, was seen in cells from 11/24 adults with chronic myeloid leukemia (9/11 in acute transformation). Karyotypes in 85% of the cells were consistent with the hypothesis that the marker is an isochromosome for the long arm of #17. The other 15% of the cells had either lost one #17 without acquiring a marker (possibly representing cells complementary to a major clone) or acquired the marker without losing a #17 chromosome (possibly resulting from duplication of the remaining chromosome #17). The relationship between karyotype and the clinical course of the disease could not be determined (all pts. had received chemotherapy and 1/11, radiotherapy as well). Although the usual male:female ratio in chronic myeloid leukemia is 2:1, the sex ratio in these pts. was 10:1; the significance of this finding could not be determined.

69-874 CYTOGENETIC STUDIES OF TWO CELL LINES OF WALKER 256 CARCINOMA GROWN IN VIVO AND IN VITRO. (Ger.) Wieser, O. (Ger. Cancer Res. Ctr., Heidelberg, Germany), V. Kinzel and U. Mohr. Z. Krebsforsch. 71(2):124-128, 1968.

Chromosomal morphology was studies in 3 lines of ascites Walker 256 carcinosarcoma: W, maintained for more than 6 yr. by successive passages in Sprague-Dawley rats: W_I maintained for 4 yr. by continuous monolayer culture in Hanks' soln. + calf serum + chick embryo extract (45:40:15 ratio); and W_{II}, maintained in the same way for 1 yr., then passaged briefly in rats, then returned to continuous in vitro culture for approx. 3 yr. Although the W line was capable of inducing tumors in rats, lines W_I and W_{II} were not. The W line showed a stemline of 63 chromosomes in 14.4% of the cells, with 15.6% plus and 70% minus variations. Line W_I (maintained entirely in vitro) showed a stemline of 72 chromosomes in only 6.5% of the cells, with 23.5% plus and 70% minus variations; line W_{II} showed 68 chromosomes in 8.7% of the cells, with 48.9% plus and 42.4% minus variations. Line W had 4 markers (3/4 metacentric, 1/4 subtelocentric), while lines W_I and W_{II} showed only 1-2 metacentric markers. Line W showed endoreduplication of chromosome groups 5-10 and 19-20 and deletion of groups 1 and 15-17; the other 2 lines showed endoreduplication and deletion of groups 15-17 and 19-20, resp. It is concluded that the changes described, which deprived lines W_I and W_{II} of their malignancy in rats, were essentially a byproduct of the culturing process.

69-875 CARCINOMA OF THE LUNG AND DIFFUSE INTERSTITIAL PULMONARY FIBROSIS. (E.) Fox, B. (Charing Cross Hosp. Med. Sch., London) and R. A. Risdon. J. Clin. Path. 21(4):486-491, 1968.

A second case of the association of lung cancer with rheumatoid arthritis and diffuse interstitial pulmonary fibrosis is reported (a 61-yr.-old man). The surgical diagnosis of benign and malignant pulmonary adenomatosis was confirmed at autopsy 1 mo. later; no residual or metastatic carcinoma was demonstrable in pulmonary sections and no primary carcinoma was demonstrable elsewhere in the body. Another pt. (a 54-yr.-old man) with diffuse interstitial pulmonary fibrosis, in the absence of any other demonstrable disorder, died 4 mo. after the onset of symptoms. Autopsy and biopsy both showed large, irregular epithelial cells in some of the alveolar spaces, closely resembling the large, anaplastic carcinoma cells found in the hilar lymph nodes and the associated peribronchial, bronchial and submucosal lymphatics. In both pts. the lung cancer was believed to be secondary to epithelial hyperplasia and scarring caused by pulmonary fibrosis.

69-876 ANALYTICAL STATISTICAL STUDY OF 200 RECTOCOLITIC ADENOMAS IN ADULTS. (Fr.) Duhamel, J. (Paris) and Ngo-Quang-Binh. Arch. Franc. Mal. Appar. Dig. 57(8-9):677-688, 1968.

Men accounted for 70% of 197 adults with rectocolitic polyps, but the male predominance decreased from 88% in pts. without dedifferentiation to 71% in pts. with dedifferentiation, to 64% in pts. with villous polyps and 66% in a small group of pts. with rectum cancer. The age incidence increased linearly with age from 15-70 yr., then decreased sharply (94/197 were over 60); the male predominance remained constant with age. Histological examination of 205 polyps showed benign adenomatous polyps (with or without inflammation) in 119/205 and suspected or definite malignancy in 86/205 (dedifferentiation 42/86, villous 30/86, villous with degeneration 5/86, carcinoma in situ 6/86, invasive carcinoma 5/86). The incidence of dedifferentiation, villous transformation and polypoid malignant tumors did not increase with age. Multiple polyps were seen in 40 pts. (20% of the group); no consistent age changes were noted, although the highest incidence (43%) was seen at age 50-60. The risk of malignancy was increased in pts. with multiple lesions, however; malignant degeneration was seen in 4.5% of pts. with single polyps, 13.2% with double polyps, 1/2 each with 3 and 4 polyps (1 polyp with villous degeneration in each case) and 1/1 with 5 polyps (1 carcinoma in situ). Large lesions (over 1 cm in diameter) were suspected or malignant in 86% of cases. The location of the lesions and the presence or absence of a pedicle was of no significance in the determination of malignancy or suspected malignancy, but the presence of irregular hardened areas may indicate malignancy. Class B (dedifferentiated or villous) polyps were associated with cancer in 10/24.

69-877 FAMILIAL POLYPOSIS WITH MALIGNANT TRANSFORMATION. (Ger.) Barabás, G. (U. Surg. Clin., Budapest). Z. Ges. Inn. Med. 23(14):443-445, 1968.

A 27-yr.-old man with multiple polyps of the colon and rectum (especially the cecum, sigmoid and rectum) underwent colectomy with ileostomy; histological examination showed adenocarcinoma in 1 polyp. This man's father and grandfather had died of colon cancer (unspecified type) at the ages of 47 and 50, resp.; his mother and siblings were healthy and no signs of g.i. disease were seen in his 4-yr.-old daughter.

69-878 ADENOCARCINOMA OF THE ILEUM COMPLICATING CHRONIC REGIONAL ENTERITIS. (E.) Morowitz, D. A. (U. Chicago, Ill.), G. E. Block and J. B. Kirsner. Gastroenterology 55(3): 397-402, 1968.

About 7 yr. after resection of an area of regional enteritis involving the terminal ileum, a 28-yr.-old man underwent a course of abdominal X-irradiation (total 300 rads) for a recurrence. Another recurrence developed 2 yr. later; for the next 9 yr. the pt. was treated with drugs (sulfonamides, corticosteroids, ACTH, anticholinergics). Complete obstruction then developed at the site of the previous surgical anastomosis; surgery showed an invasive adenocarcinoma of the ileum, arising from an area of typical regional enteritis. The pt. died 4 mo. later with metastases to the liver, pancreas, retroperitoneum and abdominal wall. A review of the literature (22 references) revealed 13 similar cases. It is suggested that a small percentage of pts. with regional enteritis may be somehow predisposed to the development of intestinal cancer, particularly since primary carcinoma of the small intestine (especially the ileum and jejunum) comprises less then 1% of all g.i. tumors. Radiation therapy was discounted as a possible cause of intestinal cancer in this pt. because of the low total dose.

69-879 MORTALITY FROM GASTRIC CANCER AND OTHER CAUSES AFTER MEDICAL OR SURGICAL TREATMENT FOR GASTRIC ULCER. (E.) Hirohata, T. (Harvard U. Sch. Pub. Health, Boston, Mass.). J. Nat. Cancer Inst. 41(4):895-908, 1968.

Follow-up data (after 8-18 yr.) were obtained for 1928 pts. (male:female ratio 1.7:1; modal age 50-59 yr.) treated medically (Group A; 1038 pts.) or surgically (Group B; 890 pts.) for benign stomach ulcer from 1945-1955. The observed/expected (O/E) mortality rates from all causes in Groups A and B were 375/297 and 357/297, resp.; the excess was significant only in the first 1 yr. in Group B and the first 3 yr. in Group A. Excess mortality from stomach ulcer was high in both groups (31-fold in Group A, 27-fold in Group B), especially in the first 5 yr. O/E mortality from liver cirrhosis was high in both groups (11/3.2 and 7/3.8, resp.), but liver ancer mortality was not significantly elevated, ince the groups were small (3/0.89 and 4/0.81, esp.). O/E mortality from cancer of all sites was 3/55 in Group A (highest in the first 1 yr.), but ot significantly elevated in Group B (60/53.18). ortality from cancer of the intestine, rectum nd respiratory tract was not significantly levated, despite the association of smoking with oth lung cancer and gastric ulcer. O/E mortality rom urinary tract cancer was not elevated in roup B (2/3.02), but slightly in excess in the irst 5 yr. in Group A (5/1.18; total 8/2.80). /E mortality from stomach cancer was 29/5.60 in roup A and 11/5.92 in Group B, mostly in the irst 5 yr. (25/2.65 and 6/2.55, resp.); most or ll of this excess mortality was attributed to ncorrect diagnosis in pts. with malignant lcers. Examination of records for the 5-yr. urvivors (9 pts.) showed only 1 possible case f true ulcer cancer.

-880 SARCOMATOUS DEGENERATION OF VARICOSE ULCER. (It.) Morando, G. C. (City osp., Genoa, Italy) and M. Amalfi. Rass. Arch. hir. 6(3):131-135, 1968.

64-yr.-old man with a varicose ulcer of the eg of about 20 yr. duration presented with roliferation and necrosis of the ulcer margin f about 7 mo. duration. Conservative surgery ith grafting was performed; the histological iagnosis was melanosarcoma. No recurrence or etastases had developed 1 yr. later. The uthors' group of pts. with varicose ulcer was oo small (number not stated) to determine the ncidence of malignant transformation, but the eported incidence is low (0.076-0.133% in 2 roups). This is believed to be the first case f melanosarcoma arising from a varicose ulcer.

-881 CHROMOBLASTOMYCOSIS WITH CARCINOMATOUS DEGENERATION. (Sp.) Coiscou, A. G. Santo Domingo U., Dominican Republic) and M. F. ourie. Rev. Dominic. Derm. 2(1):20-23, 1968.

wo farmers (1 white, 1 mestizo, age 60 and 75 r.) with asymptomatic wart-like plaques of 1 oot of 20-25 yr. duration, presented with painul, ulcerating transformation of these lesions f 8-10 mo. duration. The histological diagnosis n both pts. was epidermoid carcinoma. Direct ycological scrapings of the plaque tissues were egative, but scrapings from the periphery of he malignant ulcers grew *Phialophora* (*Hormoendron*) *pedrosoi*, confirming the diagnosis of alignant degeneration of chromoblastomycosis. genetic susceptibility to such malignant egeneration is suggested, but the family istories of these 2 pts. are not described.

9-882 TRANSFORMATION OF HASHIMOTO'S THYROIDITIS INTO GIANT FOLLICULAR LYMPHOMA AND ETICULUM CELL SARCOMA OF THE THYROID. (Rus.) Gel'bshtein, M. I. (Herzen Oncol. Inst., Moscow) and Sh. A. Nabokov. Arkh. Pat. 30(7):24-29, 1968.

Examination of 2300 thyroidectomy specimens obtained from 1928-1966 demonstrated 53 cases of Hashimoto's thyroiditis; 43/53 showed no malignant transformation (24/43 were focal, 19/43 were diffuse) and the other 10 specimens showed areas of transformation into giant follicular lymphoma (4/10) or reticulum cell sarcoma (6/10). Intermediate stages between giant follicular lymphoma and reticulum cell sarcoma were seen in 5 specimens. It is concluded that Hashimoto's thyroiditis has a high tendency to malignant transformation, proceeding from giant follicular lymphoma (presarcomatous) to reticulum cell sarcoma.

69-883 SYSTEMIC LUPUS ERYTHEMATOSUS AND NEOPLASIA OF THE LYMPHORETICULAR SYSTEM. (E.) Andreev, V. C. (Sofia U. Sch. Med., Bulgaria) and N. B. Zlatkov. Brit. J. Derm. 80(8):503-508, 1968.

The possible relationship between systemic lupus erythematosus (SLE), and lymphomas and other "immunoproliferative" disorders is discussed in relation to 2 pts. with SLE who later developed lymphatic leukemia and Hodgkin's disease. In these pts., the initially positive LE cell phenomenon and the antinuclear antibody tests became negative as the lymphoma developed. In 40 control pts. with lymphoma, metastasizing carcinoma or sarcoidosis, similar immunological investigations proved positive in 2/40. Lymphoid proliferation, as in leukemia or Hodgkin's disease, is usually accompanied by immunological disturbances. Antibody production by the abnormal lymphoid cells during the proliferative process tends to be inadequate and the immunological response characteristic of SLE is lost. It is suggested that although the occasional association of an SLE-like syndrome with carcinoma may well be fortuitous, the development of the immunoproliferative disorders in SLE may indicate a causal relationship.

69-884 INVERTED PAPILLOMA AND SQUAMOUS CARCINOMA: AN UNUSUAL CASE. (E.) Fechner, R. E. (Baylor U. Coll. Med., Houston, Tex.) and D. O. Alford. Arch. Otolaryng. (Chicago) 88(5):507-512, 1968.

A 53-yr.-old man, who had undergone surgery for nasal polyps 8 yr. previously, was admitted with a typical inverted papilloma of the right maxillary, ethmoid and sphenoid sinuses. The tumor was removed and the edges electrocoagulated; a 20% podophyllin soln. in tincture of benzoin was added to the packing material. The pt. was lost to follow-up for 1 yr., then returned with a mass of the right inferior turbinate and maxillary sinus, identified histologically (4 mo.

later) as a poorly differentiated squamous cell carcinoma with some areas of keratinization. Examination of this surgical specimen showed no signs of residual inverted papilloma, and no evidence of transformation of the papilloma to a carcinoma. It is suggested that the carcinoma may have coexisted with the papilloma at the time of the first operation. The relationship of the podophyllin application to the development of carcinoma could not be determined.

69-885 ESTROGEN METABOLISM IN POSTMENOPAUSAL WOMEN WITH PRIMARY AND RECURRENT BREAST CANCER. (E.) Grönroos, M. (Turku U., Finland) and A. J. Aho. Europ. J. Cancer 4(5):523-527, 1968.

Basal mean total estrogen excretion in 34 postmenopausal pts. with untreated (14) or recurrent (10) breast cancer and in 10 normal controls of the same age (mean 60.2-63.8 yr.) was 9.6, 13.2 and 13.6 μg/24 hr., resp. The ratio of estriol (E_3) to estrone (E_1) + estradiol (E_2) was 55:45 in untreated cancer, 54:46 in recurrent cancer and 37:63 in controls; this difference was not statistically significant, but E_2 excretion in pts. with untreated or recurrent cancer was significantly lower than in controls (1.8, 2.6 and 5.2 μg/24 hr., resp.). After loading with polyestradiol phosphate (80 mg i.m.), the increase in total estrogen excretion was significantly smaller in pts. with untreated cancer (15.6 μg/24 hr.; 50% E_3, 50% E_1 + E_2) than in pts. with recurrent cancer (32.5 μg/24 hr.; 55% E_3, 45% E_1 + E_2) or controls (29.7 μg/24 hr.; 44% E_3, 56% E_1 + E_2). The estrogen-stimulated increase in E_3 excretion was significantly higher in pts. with recurrent cancer than in untreated pts.

69-886 PURE ADENOMA OF THE BREAST. (E.) Persaud, V. (U. West Indies, Kingston, Jamaica), A. Talerman and R. Jordan. Arch. Path. (Chicago) 86(5):481-483, 1968.

Of 300 specimens of adenomatous tumors of the breast observed in the University Hospital of the West Indies since 1952, 279 (93.1%) were fibroadenomas, 18 (6.0%) were lactating adenomas, 2 (0.6%) were fibroadenomas of the Pontara type and 1 (0.3%) was a pure adenoma. The pure adenoma was removed from a 21-yr.-old woman who was not pregnant and had never been pregnant (which eliminated the possibility of a lactating adenoma). A survey of the world literature revealed only 2 other cases of pure adenoma of the breast (according to the authors' criteria, which emphasize the absence of fibrous components).

69-887 HEREDITARY MULTIPLE GLOMUS TUMORS (BARRE-MASSON'S DISEASE). (Rus.) Ivanov, S. S. (Orel Reg. Hosp. U.S.S.R.), A. G. Kovalev and N. I. Rybina. Arkh. Pat. 30(7): 71-72, 1968.

A 42-yr.-old woman with soft tissue tumors of the elbow and wrist joints of 20 yr. duration was hospitalized with a recurrent tumor at the cubital joint (which was removed) and numerous others of the neck, forearms, breast and trunk. The tumor from the cubital joint was identified histologically as an angiomatous variant of a glomangioma. This woman's father had 12 tumors of the same histology involving the neck, forearms, legs, abdomen and back.

69-888 MALIGNANT MELANOMA IN SIBLINGS. (E.) Andrews, J. C. (Martha Jefferson Hosp., Charlottesville, Va.). Arch. Derm. (Chicago) 98(3):282-283, 1968.

A brother and sister with cutaneous malignant melanoma arising from pigmented moles are described. The man was reportedly alive and well 3 yr. after local excision of a malignant melanoma of the neck (more extensive surgery was refused). His sister had died of melanoma 11 yr. before the man underwent surgery. There was no other known history of cancer in this family, but it is suggested that these cases and those previously published (about 14 families) lend support to the hypothesis of a genetic factor of importance in cutaneous malignant melanoma.

69-889 MULTIPLE PRIMARY CARCINOMAS ASSOCIATED WITH HODGKIN'S DISEASE. (E.) Whitelaw, D. M. (U. British Columbia, Vancouver, Canada). Canad. Med. Ass. J. 99(7):291-294, 1968.

A 43-yr.-old man with Hodgkin's disease of 14 yr. duration underwent lobectomy for keratinizing squamous cell carcinoma of the lung. An axillary mass of some 10 yr. duration was identified as Hodgkin's disease 7 yr. later and the pt. was treated by local radiotherapy and alkylating agents. During the next 4 yr. the pt. developed 3 basal cell carcinomas, 1 intraepidermal epithelioma of Jadassohn (1 yr. later), 5 more basal cell carcinomas of the face and scalp (during the next 2 yr.), and 2 dermatofibromas of the arms (all removed by surgery). Several recurrences of lymphadenopathy were treated by irradiation during this time. Approx. 1 yr. later, a mucoepidermoid carcinoma of the submaxillary gland (low-grade malignancy) was also removed surgically, but the pt. died of stomach cancer shortly thereafter. Autopsy showed adenocarcinoma of the stomach with lymph node, peritoneal and liver metastases; no residual Hodgkin's disease could be demonstrated. The lymphocyte-mediated immune system, studied shortly before death, appeared to be normal or nearly so. However, the pt. had no detectable immunoglobulin-A and gave no reaction to various inj. antigens (to some of which he had previously been sensitive), indicating a concurrent lack of immunoglobulin-E. It is suggested that the surveillance system (if any) which functions to eliminate potentially malignant cells may not be ntirely dependent on the lymphocyte-mediated mmune system. The relatively low doses of itrogen mustard (38 mg) and cyclophosphamide about 4 g) could not account for the disappearance f Hodgkin's disease, and radiation carcinogenesis as considered unlikely because none of the umors developed in irradiated areas (about 7000 ads to the neck and 4200 rads to 1 axilla).

-890 EFFECT OF HORSE SERUM, FETAL CALF SERUM, CALF SERUM, BOVINE SERUM, AND ETUIN ON NEOPLASTIC CONVERSION AND CHROMOSOMES F MOUSE EMBRYO CELLS IN VITRO. (E.) Parshad, . (NCI, Bethesda, Md.) and K. K. Sanford. J. at. Cancer Inst. 41(3):767-779, 1968.

he NCTC 5449 and 5508 cell lines (derived from 3Hf mouse embryo cells) were cultured in vitro or 77 days in NCTC-135 medium + 10% fetal calf erum, followed by NCTC-135 medium containing 10% orse, fetal calf, calf or bovine serum, 10% orse serum + fetuin (F; 200 mg%) or F alone n 2.5 ml combined medium). All cells were nega- ive for mouse leukemia virus or its antigens. he cells were assayed for malignant conversion intraocular implantation in C3Hf mice or i.m. noc. after total-body irradiation (425 r). Cells f both lines grown in horse and calf serum nderwent malignant conversion (forming sarcomas) arlier than cells grown in fetal calf serum after 196, 196 and 308 days in vitro, resp., for ell line 5449). Preliminary results suggested hat F might delay transformation. Calf, fetal alf and bovine sera reduced the rate of hetero- loid transformation and the increase in abnormal hromosomes, compared to results seen with horse erum; cells in horse serum became completely eteroploid during the first 103 days in vitro, ompared to 187 and 210 days with calf and ovine serum, resp. Chromosomal breaks seemed o occur at or near the centromere in all cases. ost abnormal chromosomes appearing during n vitro cultivation were minutes and metacen- rics; these were most numerous in cells grown n horse serum (av. 64.7 and 30.0/100 cells, esp.), compared to 10.0 and 3.8/100 cells, resp., n fetal calf serum. The presence of F in the edium seemed to delay heteroploidy and reduce he frequency of abnormal chromosomes.

9-891 COMPARATIVE PHYSIOLOGY OF L-M CELLS PROPAGATED IN VITRO AND IN FEMALE AND ALE MICE. (E.) Hellman, K. B. (Oak Ridge Nat. ab., Tenn.), A. Hellman, R. B. Cumming and G. D. ovelli. J. Nat. Cancer Inst. 41(3):653-664, 968.

-M mouse fibroblasts propagated in vitro pro- luced fibrosarcomas when inoc. into intact, un- reated female and male C3H/Anf mice. Because irradiation before inoc. stimulated tumor develop- ment in both sexes, all animals received a single whole-body dose of 425 r. Definitive results were obtained 56-63 days after i.m. inoc. of the cells. At this time, 35% of the tumors in females and 56% in males had regressed (a significant sex difference). Incorporation of ^{3}H-uridine into tumor tissue RNA in females was 44-54% greater than in males; the sex difference in ^{3}H-thymidine incorporation into DNA was somewhat smaller. Chromosomal changes in male hosts were slight, but cells grown in female hosts appeared to show an increased bimodal karyotypic variability. Tumor growth was greater in pregnant than in non-pregnant females; tumor wt. 14 days after inoc. was 3-5 g greater in pregnant animals than in non-pregnant mice, suggesting a hormonal influence on tumor development. Other experiments in intact, orchiectomized or oophorectomized mice admin. estradiol or progesterone could not elucidate the role of progesterone in this tumor. Evidence from the incidence and regression of tumors in animals inoc. at age 5 and 7 wk. indicated greater host resistance in the older animals.

69-892 THYMIC ANAEROBIC GLYCOLYTIC RATES IN HIGH-INCIDENCE AND LOW-INCIDENCE LEUKEMIC MICE. (E.) Souadjian, J. V. (Mayo Grad. Sch. Med., U. Minnesota, Rochester), M. N. Silverstein and J. L. Titus. Proc. Soc. Exp. Biol. Med. 129(1):131-133, 1968.

Anaerobic glycolysis rates (AGR) were studied in thymus tissue from 6-10-wk.-old female mice of strains AKR (high-leukemia) or Ha/ICR (low-leukemia) and in AGR mice bearing 1-17-day-old BW5147 leukemia. The AGR of thymus tissue from non-tumor-bearing AKR mice was significantly higher than the AGR of Ha/ICR thymus. Thymic AGR in tumor-free and tumor-bearing AKR mice showed a rebound phenomenon, possibly a Pasteur effect. The sudden decrease in AGR just after tumor inoc. (in the absence of any signs of leukemia) may have resulted from a preleukemic change in the glycolytic pattern; the increase in AGR after day 6 may have reflected accelerated glycolysis by leukemic cells infiltrating the thymus.

69-893 SPECIES SPECIFICITY IN GROWTH REGULATORY EFFECTS OF CELLULAR INTERACTION. (E.) Eagle, H. (Albert Einstein Coll. Med., Bronx, N. Y.), E. M. Levine and H. Koprowski. Nature (London) 220(5164):266-269, 1968.

The ability of superinoc. diploid or heteroploid (transformed or malignant) cells to escape from the growth-inhibitory effects of human, mouse or rabbit cell substrates was inversely related to the inherent growth potential of the superinoc. cell, regardless of its species; the population density of a cell type in pure culture was inversely proportional to its susceptibility to inhibition by substrate monolayers of other cell types. This relationship suggested that cancer cells have escaped from contact growth inhibition because they fail to respond to the normal inhibitory stimulus. Several human cancer cell lines, which were not significantly inhibited by most human diploid cells, were markedly inhibited by cell line WI 38 (diploid human fibroblasts).

69-894 QUANTITATIVE TUMORIGENICITY ASSAYS USING THE ANTERIOR CHAMBER OF THE MOUSE EYE. (E.) Boone, C. W. (NCI, Bethesda, Md.) and L. T. DuPree. Cancer Res. 28(9): 1734-1737, 1968.

In irradiated, weanling male BALB/cAnN and C3H mice, intraocular inj. of cultures of Ehrlich-Lettré ascites carcinoma cells and Sanford 2472 fibrosarcoma cells, resp., resulted in 100% tumor takes within 30 days after inoc. of only 10^1 and 10^3 cells, resp., (compared to 10^4 and 10^4 cells, resp., after i.m. inoc., or 10^6 cells after either i.p. or i.m. inoc. in nonirradiated animals). The method employed (which is described in detail) entailed no leakage, as confirmed by retention of trypan blue. An illustrative tumorigenicity study comparing this intraocular procedure with i.m. and i.v. inoc. is recorded, as is the development of a cell line culture from an intraocular fibrosarcoma transplanted s.c. through 3 in vivo passages prior to explant, and continued development through 5 in vitro passages.

69-895 MALIGNANT TRANSFORMATION OF THE REMAINING OVARIES. (Ger.) Kese, G. (First Gynec. Clin., U. Cluj-Klausenburg, Rumania) and A. Drăghici. Zbl. Gynaek. 90(40):1362-1366, 1968.

From 1958-1965, 3 women with malignant ovarian tumors (bilateral in 2/3) developing 6-14 mo. after partial hysterectomy (hystx.) were seen, accounting for 3/79 of the authors' pts. with malignant ovarian tumors. Two of these pts. had undergone hystx. elsewhere; the other was the only pt. in the authors' group of 265 women (incidence 0.37%) who had undergone hystx. with preservation of 1 or both ovaries (35 and 230/265, resp.). None of these pts. had undergone hystx. for cancer. Indications for bilateral oophorectomy associated with hystx. are discussed. One of these is a family history of cancer, illustrated by 1 further case (seen in 1967): a 48-yr.-old woman with ovarian pseudomucinous cystadenoma developing about 1 yr. after subtotal hystx. for uterine myoma, whose 19-yr.-old daughter had died of an ovarian tumor 3 yr. previously.

69-896 SOME GENETIC ASPECTS OF FAMILIAL MULTIPLE POLYPOSIS OF THE COLON IN A KINDRED OF 1,422 MEMBERS. (E.) Pierce, E. R. (U. Louisville, Ky.). Dis. Colon Rectum. 11(5): 321-329, 1968.

Statistical data for 7 generations (1422 subjects) descended from a single couple were tabulated: 1/3 of their sons was normal (as were his 75 descendants); 1/3 had polyposis of the colon (PC) and transmitted it to 53/934 descendants; 1/3 was a PC carrier and 27/411 descendants were affected. A pedigree table of affected descendants of these sons showed 37 cases of verified or probable g.i. cancer (14 male, 23 female) associated with PC. In 30 of these pts. (12 males, 18 females) with PC, the age at diagnosis of cancer was 20-39 yr. in 15/30 and 40-59 yr. or over in 15/30. The sex distribution of 94 PC-affected pts. (72 with proven PC, 8 with deduced PC, 14 carriers) was about equal (44 males, 50 females). PC-affected fathers tended to transmit the disease slightly more often to their sons than to their daughters (30/64 and 27/70, resp., were affected); PC-affected mothers showed a significantly higher transmission of PC to their daughters than to their sons (23/70 and 12/73, resp., were affected). The penetrance of the PC gene in this kindred was 49.43%. Analysis of statistical data from Kentucky showed an incidence of the PC gene at birth of 1/6850 and a mutation rate for the PC locus of 12 mutations/1 million loci/generation.

69-897 CANCER OF THE GASTRIC STUMP FOLLOWING RESECTION FOR ULCER. (Rus.) Okruzhko, Iu. I. (83 Komsomol St., Mogilev-Podolskii, USSR). Klin. Khir. (Moskva) (8):62-63, 1968.

69-898 PRIMARY CARCINOMA OF THE GASTRIC STUMP AND OF THE GASTROJEJUNAL NEOSTOMA FOLLOWING RESECTION OF THE STOMACH IN THE TREATMENT OF ULCERS. (It.) Boselli, P. L. (U. Padua, Italy) and A. De Medici. Minerva Chir. 23(12): 605-614, 1968.

See also abstract no.: 710

AUTHOR INDEX

Abt, D. A. 813,814
Aho, A. J. 885
Aleksandrowicz, J. 678
Alford, D. O. 884
Altman, R. F. A. 735
Amalfi, M. 880
Anderson, A. E., Jr. 720
Anderson, R. K. 809
Andreev, V. C. 883
Andrews, J. C. 888
Ayre, J. E. 774

Bader, J. P. 796
Baldwin, R. W. 757
Ballini-Kerr, I. 735
Baló, J. 716
Bamberger, K. 799
Barabás, G. 877
Barbieri, D. 849
Barnes, J. M. 746
Barski, G. 849
Bartus, B. 756
Bauer, H. 800
Becker, N. H. 771
Bentvelzen, P. 838
Bernard, C. 795
Bierwolf, D. 785
Bilski-Pasquier, G. 873
Biozzi, G. 853
Biskis, B. O. 770
Bjerknes, R. 733
Black, P. H. 686
Blair, P. B. 840
Block, G. E. 878
Bodenham, D. C. 863
Boegler, F. 698
Boiron, M. 795
Bollmann, R. 737
Bonmassar, E. 730
Boone, C. W. 894
Börner, P. 752,753
Boselli, P. L. 898
Bousser, J. 873
Brand, K. G. 732
Bresnick, E. 747
Brookes, P. 681,711
Bross, I. D. J. 864
Brown, E. V. 701
Bücheler, J. 740, 741
Bulfone, L. M. 782
Buoen, L. C. 732
Burford, B. O. 712
Burg, C. 839
Burgoyne, G. H. 819
Burmester, B. R. 819
Busch, H. 743
Butler, W. H. 746
Buu-Hoï, N. P. 728

Cabrini, R. L. 866
Carel, R. 871
Carswell, E. A. 758
Castro, H. F. 765
Chai, L. S. 775
Chang, L. M. S. 841
Chapman, A. L. 792
Chessim, L. N. 772
Chieco-Bianchi, L. 845
Chin, T. D. Y. 792
Chomiak, T. W. 824
Clark, W. R. 835
Clarke, W. J. 695
Coiscou, A. G. 881
Cumming, R. B. 891
Curtis, M. R. 727

Daams, J. H. 838
Dallavalle, R. 730
Da Silva, D. J. 735
DeBaun, J. R. 755
De Bonaparte, Y. P. 866
Dechambre, R. P. 812
Defendi, V. 711
De Grouchy, J. 873
De Harven, E. 777
Deichmann, W. B. 763
Della Porta, G. 679
Delwaide, P. 742
De Medici, A. 898
De Nava, C. 873
DeOme, K. B. 840
De-Thé, G. 846
Dezfulian, M. 840
Diamond, L. 711
Dipple, A. 681
DiStefano, H. S. 797
Dolphin, G. W. 682
Dontenwill, W. 717,729
Dougherty, R. M. 797
Dowd, J. E. 864
Downs, W. L. 764
Drăghici, A. 895
Druckrey, H. 738,741
Dubbs, D. R. 831
Düchting, W. 676
Duesberg, P. H. 826
Dufour, M. 728
Duhamel, J. 876
Dulbecco, R. 830
Dunning, W. F. 727
DuPree, L. T. 894

Eagle, H. 893
Ehlers, G. 725
Eidson, C. S. 820,821,822
Ellison, R. R. 775
Elmenhorst, H. 717,719
Epstein, S. M. 756

Fallon, R. J. 778
Farber, E. 756
Farrell, C. 770
Fechner, R. E. 765,884
Feingold, J. 873
Feldman, D. G. 789
Figueroa, M. E. 773
Finkel, M. P. 770
Fiore-Donati, L. 845
Flaks, B. 754
Fletcher, T. L. 699,700
Floyd, L. R. 743
Foraker, A. G. 720
Foster, A. G. 818
Foster, H. F. 782
Fox, B. 875
Frank, H. 783
Frankel, H. H. 745
Fredrickson, T. N. 702
Freeman, G. 829
Friedman, M. 794
Fujisawa, T. 857
Fukunishi, R. 759
Fukushige, M. 766
Fuller, J. L. 694
Furlaneto, J. A. 720

Gasse, H. 815
Gebert, P. 709
Gel'bshtein, M. I. 882
Gelfand, M. 723
Gelzer, J. 852
Gentile, G. 808
Giao, N. B. 728
Gibson, R. W. 864
Gigon, P. L. 748
Gillette, J. R. 748
Giuliani, G. 730
Glade, P. R. 772
Gladkovskaia, A. A. 714
Glass, R. M. 702,745
Glenn, E. S. 836
Glover, E. L. 708
Gössner, W. 753
Grabar, P. 688
Grace, J. T., Jr. 775,781
Gräf, W. 707
Graham, A. J. P. 723
Graham, S. 864
Gram, T. E. 748
Grantham, P. H. 744
Gravelle, C. R. 792
Green, G. M. 721
Greene, F. E. 748
Gresser, I. 844
Grignon, G. 839
Grönroos, M. 885
Gross, L. 692,789
Groulade, P. 790,791
Grover, P. L. 749
Guarino, A. M. 748
Guillemain, B. 795

Habel, K. 684
Hackett, P. L. 695
Hadidian, Z. 702

Haguenau, F. 843
Hänichen, T. 869
Harada, H. 761,762
Haran-Ghera, N. 787
Hardy, E. P., Jr. 697
Hare, W. C. D. 842
Harke, H.-P. 717,719
Hasse, G. 817
Hatziolos, B. C. 804
Heberman, R. B. 772
Hecker, E. 739
Hellman, A. 891
Hellman, K. B. 891
Henriksson, K. 816
Hernes, D. 868
Higashi, J. 759
Higuchi, T. 857
Hilleman, M. R. 835,836
Hirohata, T. 879
Hirshaut, Y. 772
Hirukawa, A. 857
Hodes, M. E. 841
Hodge, H. C. 764
Hoffmann, D. 675
Hoffmann, U. 854
Horoszewicz, J. S. 775
Howard, E. B. 695
Howe, C. D. 848
Hugoson, G. 816
Huppert, J. 801

Inomata, M. 705
Inoue, T. 865
Isaka, H. 872
Ishibe, T. 766,768,769
Ito, Y. 827
Ivankovic, S. 740,741
Ivanov, S. S. 887
Iversen, O. H. 733
Iversen, U. 733

Jackson, D. K. 778
Jacquignon, P. 728
Järplid, B. 696
Jensen, F. C. 833
Jordan, R. 886
Jovanović, M. J. 811

Kaliss, N. 694,734
Kara, J. 825
Karande, K. A. 760
Kasel, J. A. 772
Kavaklieva-Dimitrova, I. 867
Kawaji, K. 759
Kazama, K. 857
Kazuta, M. 766
Keast, D. 788
Kendrey, G. 716
Kese, G. 895
Kessel, H. 751
Khadzhiev, S. 867
Kinzel, V. 874
Kirsner, J. B. 878
Kirsten, W. H. 847
Kit, S. 831
Knowles, B. B. 833
Kodama, M. 705
Kojo, Y. 857
Kołodziejska, H. 855
Koprowski, H. 833,893
Kotler, M. 787
Kottaridis, S. D. 823,824
Kourie F., M. 881
Kovalev, A. G. 887
Kozlov, M. Ia. 862
Krakoff, I. H. 828
Kriegel, H. 698
Kröger, H. 751
Kuretani, K. 767
Kurita, Y. 710
Kuschner, M. 683

Lacassagne, A. 728
Lacour, F. 812
Lamensans, A. 853
Landschütz, Ch. 738
Larson, V. L. 809
Larson, V. M. 835,836
Lawley, P. D. 681
Lawrence, S. S. 784
Lazar, P. 815
Lazurkina, V. D. 862
Leclere, M. 839
LeGuerrier, J. M. 774
Levij, I. S. 726,871
Levin, M. L. 864
Levine, E. M. 893
Libánský, J. 850
Lightman, E. 723
Lilienfeld, A. M. 864
Lorenz, K. 709
Luginbuhl, R. E. 823,824

Maass, H. 677
MacDonald, W. E. 763
Mach, O. 850
Manderson, W. G. 856
Mantel, N. 702
Mantovani, A. 808
Marcato, P. S. 808
Marquardt, H. 706
Marshak, R. R. 813
Maruyama, K. 857
Mass, R. E. 784
Mathé, G. 780
Mayer, L. A. 847
Maynard, E. A. 764
Mayyasi, S. A. 782
McCalla, D. R. 703
McCutchan, J. H. 832
McFeely, R. A. 842
McLean, E. P. 758
McNary, J. 756
Melnick, J. L. 691,773
Miller, D. G. 794
Miller, E. C. 755
Miller, J. A. 755
Mirand, E. A. 781
Mistry, P. B. 760
Mittelman, A. 775
Mizoguchi, M. 766
Mohan, L. 744
Mohr, U. 874
Mokuno, J. 865
Moldovanu, G. 794
Moll, T. 818
Mollier, M. F. 853
Moore, A. E. 794
Moore, M. 757
Morando, G. C. 880
Morecki, R. 771
Morgenfeld, M. C. 866
Morowitz, D. A. 878
Moses, H. L. 772

Nabokov, Sh. A. 882
Nagasawa, H. 767
Nagata, C. 705
Namkung, M. J. 699,700
Neiman, J. M. 731
Nenquin, G. 713
Ngo-Quang-Binh 876
Nielsen, A. H. 792
Nishiyama, H. 865
Nishizuka, Y. 710
Nordenskjöld, B. A. 828
Novelli, G. D. 891
Novotná, O. 850

Oettgen, H. F. 758
Okruzhko, Iu. I. 897
Old, L. J. 758
Ono, T. 857
Opler, S. R. 786
Osato, T. 827
Osswald, H. 718
Oth, D. 839

Pagano, J. S. 832
Pan, H.-L. 700
Panteleakis, P. N. 836
Parshad, R. 890
Patrick, R. S. 856
Paul, D. 739
Pearson, G. 829
Pennelli, N. 845
Peries, J. 795
Perman, V. 809
Persaud, V. 886
Peters, E. E. 856
Phillips, P. A. 788
Pierce, E. R. 896
Pinkel, D. 851
Pister, L. 783
Poche, R. 854
Polishuk, W. Z. 861
Polliack, A. 726
Post, J. E. 793
Preussmann, R. 738,741
Pugachiov, O. 735

Rabotti, G. F. 843
Rangan, S. R. S. 760
Rapp, F. 685
Rawls, W. E. 773
Reckzeh, G. 717,729
Ressel, F. A. 774
Reuber, M. D. 708
Reuvers, A. 703
Rich, M. A. 693
Rickard, C. G. 793
Risdon, R. A. 875
Rivera, J. 697
Rodriguez, E. 866
Rondia, D. 742
Rosenberger, G. 803
Rosenbergova, M. 801
Rowley, J. Y. 755
Rwomushana, J. 726
Rybina, N. I. 887

Salaman, M. H. 779
Salvi, M. R. 831
Sambrook, J. 830
Sanders, F. K. 712
Sanford, K. K. 890
Sano, T. 715
Schäfer, W. 783,800
Schell, K. 837
Schenker, J. G. 861
Schiefer, B. 869
Schilling, H. 858
Schjønsby, H. 868
Schmähl, D. 718
Schmidt, F. W. 817
Schmittle, S. C. 820,821, 822
Schuman, L. M. 864
Seemayer, N. 834
Sevoian, M. 798
Sharma, A. K. 736
Shibley, G. P. 782
Shope, R. E., Jr. 809
Shullenberger, C. C. 848
Siegel, B. V. 784
Siegler, R. 693
Silberman, M. S. 821
Silverstein, M. N. 892
Sims, P. 749
Singh, C. M. 870
Sinkovics, J. G. 848
Small, C. S. 859
Smith, D. W. 764
Snider, B. J. 701
Somers, K. D. 847
Sorensen, D. K. 809
Souadjian, J. V. 892
Spatz, M. 724
Spjut, H. J. 765
Srinivasan, P. R. 830
Stadler, L. 717
Stamatović, S. M. 811
Stanley, N. F. 788
Staszewski, J. 860
Steinitz, R. 861
Steplewski, Z. 833
Sterglanz, H. 704
Stevens, M. 727
Stevenson, J. G. 747
Stewart, S. E. 776
Stiffel, C. 853
Stöber, M. 802
Straub, O. C. 806,807
Sugano, H. 722
Sugiyama, T. 710
Suter, R. B. 734

Tagashira, Y. 705
Takahashi, I. 857
Takayama, S. 722
Takenaka, I. 766
Talerman, A. 886
Talukdar, G. 736
Tanaka, K. 689
Terashi, S. 759
Thomas, C. 737,741
Thomas, J. A. 859
Timmermans, A. 838
Titus. J. L. 892
Tkachev, P. G. 714
Tompkins, W. A. F. 773
Tridente, G. 845

Unuma, T. 743

Valentine, A. F. 796
Van der Gugten, A. 838
Vennström, R. 816
Veres, J. 716
Vigier, P. 687
Vittoz, R. 810
Von Rahden, U. 706

Watanabe, K. 759
Weiler, O. 812
Weinhold, E. 806,807
Weinstein, I. B. 750
Weisburger, E. K. 680,702,744,745
Weisburger, J. H. 680,702,744,745
Weiss, D. W. 840
Werder, A. A. 792
Whitelaw, D. M. 889
Wieser, O. 874
Winter, C. 707
Witter, R. L. 819
Wittmann, W. 805
Wright, B. S. 782
Wynder, E. L. 675

Yamamoto, R. S. 744,745
Yanai, R. 767
Yielding, K. L. 704
Yohn, D. S. 775
Yoshida, K. 851
Youn, J. K. 849

Zajdela, F. 728
Zakhariev, T. 867
Zee, T. 840
Zlatkov, N. B. 883

SUBJECT INDEX

ACETAMIDE, 2-FLUORENYL-
  liver carcinogenesis, mechanism, rat: 756
ACETANILIDE
  effect on
    fluorenylacetamide liver carcinogenesis, rat: 745
      metabolism, rat: 744
2-ACETYLAMINOFLUORENE (See N-2-Fluorenylacetamide)
AFLATOXIN(S)
  liver tumors, rat: 746
AFLATOXIN B-1
  effect on nucleolar RNA, normal rat liver: 743
AIR POLLUTION
  industrial areas, Belgium (Charleroi and Vilvorde): 713
  irritant sensitivity, high- or low-pollution areas, children: 714
AMINOPHENAZONE
  leukemogenesis, child: 709
ANTIOXIDANTS
  effect on benzpyrene carcinogenesis, mouse: 730
ANTITUMOR AGENTS
  hydroxyurea, effect on polyoma virus, normal cells: 828
ARSENIC
  drugs containing, skin cancer, human: 725
ASBESTOS
  occupational exposure, lung cancer risk, Japan: 715
AZOBENZENE, 4-DIMETHYLAMINO-
  analogs, screening, rat: 701
  hepatoma, membrane-associated tumor-specific antigens, rat: 757
AZOBENZENE, 3'-METHYL-4-DIMETHYLAMINO-
  effect on nucleolar RNA, regenerating rat liver: 743
AZOTOLUENE, o-AMINO-
  effect on benzpyrene or dimethylbenzanthracene skin carcinogenesis, mouse: 731

BABESIOSIS
  vaccine, bovine leukosis transmission: 816
BENZ(a)ANTHRACENE, 4,5-DIMETHYL-
  sarcoma, rat: 727
BENZANTHRACENE, 7,12-DIMETHYL-
  distribution, animal: 717,739
  effect on
    immunity, mouse skin: 780
    pituitary prolactin and mammary gland, rat: 767
  leukemia, chromosome morphology, rat: 710
    virus isolation, mouse: 787
  liver metabolism, age and species differences: 749
  premalignant cheek pouch lesions, hamster: 726
  resistance, mechanism, normal cells: 711
  sarcoma, tumor immunity, guinea pig: 758
  skin tumors, mouse: 731,739
BENZ(a)ANTHRACENE, 4,5,10-TRIMETHYL-
  sarcoma, rat: 727

BENZO(a)ACRIDINE DERIVATIVES
  sarcoma, structure-activity relationships, mouse: 728
3,4-BENZPYRENE
  analysis, petroleum and products: 707
  distribution, respiratory tract, hamster: 717
  free radical formation, cell-free system: 705
  liver enzyme induction, effect of radiation and other chemicals, rat: 742
  sarcoma, cytochemistry, rat: 736
    effect of antioxidants, mouse: 730
  skin tumors, mouse: 729,731
BETEL NUTS
  chewing, upper respiratory cancer, Cambodia: 862
BIPHENYL, 4-AMINO-
  toxicity, dog: 764
BIPHENYL, 4-AMINO-3,2'-DIMETHYL-
  female genital tumors, rat: 765
BLADDER CARCINOGENESIS
  dibutylnitrosamine, guinea pig: 740
BLOOD
  serum proteins, spontaneous myeloid or lymphatic leukemia, dog: 791
BONE NEOPLASMS
  human osteosarcoma, virus isolation and hamster pathogenicity: 770
  induction, ^{90}Sr-^{90}Y, rat: 698
BREAST NEOPLASMS (See Mammary neoplasms, human)
BRONCHUS NEOPLASMS
  smoking, Africa (Rhodesia): 723

CARCINOGENESIS, CHEMICAL
  diethylnitrosamine, pregnant rat and offspring: 737
  lung, animal, review: 683
CARCINOGENS (CHEMICAL)
  and food additives, review: 680
  mechanism of action, review: 681
  screening, methods, rat: 702
    newborn animals, review: 679
  transformed cell lines, effect of nitrosomethylurea: 712
CERVIX UTERI NEOPLASMS
  cervical stump: 858
  epidemiology, Poland (urban and rural): 860
  and herpesvirus Type 2 infection: 773
  premalignant, possible virus-positive "halo" cells: 774
CHOLESTEROL
  effect on methylcholanthrene carcinogenesis, mouse: 735
CHROMOSOMES
  bovine leukosis: 842
  clone evolution, chronic myeloid leukemia: 873
  dimethylbenzanthracene leukemia, rat: 710
  in vivo and *in vitro* lines, exptl. tumor: 874
  sex, variations with menstrual cycle, normal women: 871
  Yoshida sarcoma and variants, rat: 872

- CIRCUMCISION
  - and penis cancer, India: 859
- COLON NEOPLASMS
  - familial polyposis: 896
    - malignant transformation (3 generations): 877
  - rectocolitic polyps, risk of malignant transformation: 876
- CONNECTIVE TISSUE NEOPLASMS
  - fibrosarcoma, virus isolation: 776
  - induction, ^{90}Sr-^{90}Y, rat: 698
- CULTURE MEDIA
  - malignant transformation of mouse embryo cells: 890
- CYCASIN
  - mammary tumors, rat: 759
  - metabolism, skin, fetal and newborn rat: 724

- DIETARY HABITS
  - upper respiratory cancer, Cambodia: 862
- DISEASE TRANSMISSION
  - bovine leukosis: 812
    - babesiosis vaccination: 816
    - review: 678
  - human leukemia, review: 678
- DISTRIBUTION
  - dimethylbenzanthracene, liver, kidney and skin, mouse: 739
- DUST
  - occupational exposure, lung cancer risk, Japan: 715

- ENDOCRINE ABLATION
  - tumor stimulation, rat: 761
- ENZYMES
  - alkaline phosphatase, leukemia virus infection, mouse: 784
  - benzpyrene or methylcholanthrene sarcoma, rat: 736
  - diethylnitrosamine liver carcinogenesis, rat: 753
  - DNA-mobilizing, structure, Shope fibroma virus: 841
  - glucose-6-phosphate dehydrogenase, diethylnitrosamine liver carcinogenesis, rat: 752
  - liver, induction, effect of radiation or chemicals, rat: 742,751
  - lactate dehydrogenase, chemical kidney carcinogenesis, rat: 768,769
  - microsomal, effect of methylcholanthrene, rat liver: 747,748
- EPIDEMIOLOGY
  - all tumors
    - Bulgaria (Plovdiv), and TB mortality: 867
    - Germany (Düsseldorf): 854
    - Poland (Cracow and environs): 855
  - avian leukosis, control, Hungary: 799
  - bovine leukosis
    - and babesiosis vaccination, Åland Islands (Sweden): 816
    - France: 815
    - Germany (Saxony): 817
    - prevention, methods: 810
    - Yugoslavia: 811

- EPIDEMIOLOGY (Contd.)
  - bovine lymphosarcoma, buffaloes, India: 870
  - breast and cervix cancer, Poland (urban and rural): 860
  - heart metastases, Norway (Bergen): 868
  - leukemia, Japan (central): 865
  - liver cancer, Japan (Yokohama): 857
    - Scotland (Glasgow and western areas): 856
  - lymphoma, leper colony (Argentina): 866
  - melanoma, England (southwestern): 863
  - nasopharynx tumors, dogs and cats, Germany (Munich): 869
  - ovary cancer, Israel: 861
  - penis cancer, India (southern): 859
  - upper respiratory cancer, Cambodia: 862
- ESOPHAGUS NEOPLASMS
  - induction
    - methylbutylnitrosamine, rat: 738
    - nitrososarcosine ethyl ester, liver RNA and enzymes, rat: 751
- ETHIONINE
  - liver tumors, role of transfer RNA, rat: 750

- FLUORENE DERIVATIVES
  - possible fluorenylacetamide metabolites,
    - antitumor effects (mouse): 699
    - synthesis: 699,700
- N-2-FLUORENYLACETAMIDE
  - liver tumors
    - effect of acetanilide, rat: 745
    - ultrastructure, rat: 754
  - metabolism, effect of acetanilide, rat: 744
- N-2-FLUORENYLACETAMIDE, N-ACETOXY-
  - possible metabolites, synthesis and antitumor effects (mouse): 699
- N-2-FLUORENYLACETAMIDE, N-HYDROXY-
  - liver carcinogenesis, species differences: 755
  - possible metabolites, synthesis: 700
- FOOD ADDITIVES
  - and carcinogens, review: 680
- FOODS
  - cows' milk, ^{90}Sr levels: 697
- FREE RADICALS
  - from benzpyrene in vitro, cell-free system: 705
- FUNGAL INFECTIONS
  - chromoblastomycosis, malignant transformation: 881

- GASTROINTESTINAL CARCINOGENESIS
  - methylbutylnitrosamine, rat: 738
  - methylnitrosourea, guinea pig: 741
  - methylnitrosourethan, guinea pig: 741
  - nitrososarcosine ethyl ester, liver RNA and enzymes, rat: 751
- GENETICS, ANIMAL
  - bovine leukosis susceptibility: 813,814
  - mammary tumor virus transmission, mechanism, mouse: 838
- GENETICS, HUMAN
  - and cancer, review: 689
  - familial colon polyposis with g.i. cancer: 876,877,896

GENETICS, HUMAN (Contd.)
  glomangioma, father and daughter: 887
  melanoma, siblings: 888
  ovary cancer, mother and daughter: 895
GENETICS, MICROBIAL
  SV40 genome and hamster tumor induction, review: 685
GENITAL NEOPLASMS, FEMALE
  induction, 3,2'-dimethyl-4-aminobiphenyl, rat: 765

HALLUCINOGENS
  LSD, binding to DNA, cell-free system: 704
HEART NEOPLASMS
  metastatic, epidemiology, Norway (Bergen): 868
HEMATOPOIESIS
  erythroid, effect of polycythemia or leukemia viruses, mouse: 781
HERBICIDES
  toxicity, animal: 764
HORMONES
  adrenal, tumor stimulation, rat: 762
  effect on exptl. tumors: 761
  metabolism, breast cancer: 860,885
      review: 677
    cervix cancer: 860
  sex, effect on methylcholanthrene prostate tumors, rat: 766
    tumor stimulation, rat: 762

IMMUNITY
  adenovirus-induced tumors, hamster: 835,836
  avian myeloblastosis-sarcoma viruses, chicken and mammal: 800
  effect of chemical carcinogens, animal: 752, 757,758,780
  host resistance, Hodgkin's disease with multiple primary carcinomas: 889
    mouse: 734
  human cancer, review: 688
  polyoma virus-induced tumors, hamster: 829
  tumor resistance, mouse: 734,853
  virus-induced leukemia, mouse: 779,780,782, 844,845,852
    mammary tumors, mouse: 839,840
IMMUNITY DISORDERS
  systemic lupus erythematosus, with leukemia or lymphoma: 883
IMMUNOSUPPRESSIVE AGENTS
  effect on Marek's disease, chicken: 818
INJURIES (See also under Scar tissue)
  lung, and lung cancer, review: 683
  stress, effect on spontaneous leukemia or methylcholanthrene carcinogenesis, mouse: 694
INTESTINE, SMALL
  regional enteritis, malignant transformation: 878
INTESTINE, SMALL, NEOPLASMS
  from regional enteritis: 878

KIDNEY CARCINOGENESIS
  dimethylnitrosamine, enzyme metabolism, rat: 768

KIDNEY CARCINOGENESIS (Contd.)
  lead acetate, enzyme metabolism, rat: 769

LEAD ACETATE
  kidney tumors, enzyme metabolism, rat: 769
LEPROSY
  with lymphoma, Argentina: 866
LEUKEMIA, EXPERIMENTAL (See also under Virus, leukemia/lymphoma)
  AK (mouse), liver catalase and RES function: 853
  avian leukosis, control, Hungary: 799
  BW5147 (mouse), thymic glycolysis: 892
  spontaneous, effect of stress, mouse: 694
    mast cell, transmission, dog: 793
    monocytic, dog: 790
    myeloid or lymphatic, serum proteins, dog: 791
LEUKEMIA, HUMAN
  and bovine leukemia, review: 678
  epidemiology
    Japan (central): 865
    radiation exposure, virus disease and/or maternal reproductive history, children: 864
  karyotype: 873
  Mycoplasma antibodies: 778
  myeloid, virus-like particles: 775
  with systemic lupus erythematosus: 883
LEUKEMOGENESIS (EXPERIMENTAL)
  dimethylbenzanthracene, karyotype, rat: 710
    virus isolation, mouse: 787
  ^{90}Sr, swine, virus-like particles: 695
  tobacco tar, mouse: 722
  urethan, virus isolation, mouse: 787
LEUKEMOGENESIS (HUMAN)
  phenylbutazone, malignant reticulosis, child: 709
LEUKOSIS (LEUKEMIA), BOVINE
  epidemiology
    France: 812,815
    Germany (Saxony): 817
    Yugoslavia: 811
  genetic susceptibility and disease clusters: 813,814
  and human leukemia, review: 678
  karyotype: 842
  pathology, adult cattle: 802
  possible transmission, babesiosis vaccine: 816
  prevention, methods: 810
  transmission: 803,804,805,806,807,808,809, 811
LIVER
  benzypyrene enzyme induction, effect of radiation and other chemicals, rat: 742
  catalase, leukemia-bearing mouse: 853
  dimethylbenzanthracene metabolism, age and species differences: 749
  glycogen and DNA, carcinogen binding, rat: 756
  microsomal enzymes, effect of methylcholanthrene, rat: 747,748
  nucleolar RNA, effect of carcinogens, rat: 743

SUBJECT INDEX

IVER CARCINOGENESIS
- acetylaminofluorene, tumor ultrastructure, rat: 754
- aflatoxin, rat: 746
- dibutylnitrosamine, guinea pig: 740
- diethylnitrosamine, liver enzymes and antigens, rat: 752,753
- dimethylaminoazobenzene; tumor-specific antigens, rat: 757
- ethionine, role of transfer RNA, rat: 750
- fluorenylacetamide, rat: 745,756
- hydroxyacetylaminofluorene, species difference, mechanism: 755
- nitrosamine derivatives, enzyme and RNA metabolism: 751

IVER DISEASES
- cirrhosis, and liver cancer, Scotland (Glasgow and western areas): 856

IVER NEOPLASMS
- epidemiology,
  - Japan (Yokohama): 857
  - Scotland (Glasgow and western areas), and cirrhosis: 856

JNG
- phagocytosis *in vitro*, effect of tobacco smoke and sulfhydryl agents, rabbit: 721
- tobacco smoke distribution, human preparation: 720

JNG CARCINOGENESIS
- animal, review: 683
- occupational dust inhalation, Japan: 715
- urethan, ultrastructure, mouse: 716

UNG DISEASES
- diffuse interstitial fibrosis, malignant transformation: 875
- tuberculosis, mortality, and cancer mortality, Bulgaria (Plovdiv): 867

UNG NEOPLASMS
- diffuse interstitial pulmonary fibrosis: 875
- smoking, peptic ulcer: 879
  - review: 690

YMPHOMA, MALIGNANT, EXPERIMENTAL
- bovine lymphosarcoma, buffaloes, India: 870
- induction, tobacco tar, mouse: 722
- spontaneous Hodgkin's-like reticulum cell tumor, leukemia virus isolation, mouse: 787
  - lymphosarcoma, transplantation, dog: 794

YMPHOMA, MALIGNANT, HUMAN
- Burkitt, classification of virus: 772
- giant follicular lymphoma or reticulum cell sarcoma, from Hashimoto's thyroiditis: 882
- leprosy, Argentina: 866
- *Mycoplasma* antibodies: 778
- systemic lupus erythematosus: 883

ALIGNANT TRANSFORMATION
- chromoblastomycosis, skin cancer: 881
- familial colon polyposis: 877,896
- Hashimoto's thyroiditis, malignant hymphoma: 882
- interstitial pulmonary fibrosis, lung cancer: 875
- mouse embryo cells to sarcoma, effect of culture medium: 890
- peptic ulcer resection site, stomach cancer: 897,898

MALIGNANT TRANSFORMATION, (Contd.)
- regional enteritis, ileum adenocarcinoma: 878
- risk, rectocolitic adenomatous polyps: 876
- systemic lupus erythematosus, leukemia or lymphoma: 883
- varicose ulcer, melanosarcoma: 880

MAMMARY CARCINOGENESIS (EXPERIMENTAL)
- cycasin, rat: 759
- methylcholanthrene, pseudopregnant mouse: 760

MAMMARY GLAND
- effect of dimethylbenzanthracene, rat: 767

MAMMARY NEOPLASMS, EXPERIMENTAL (See also Virus, mammary tumor)
- spontaneous or virus-induced, immunity, mouse: 734,840

MAMMARY NEOPLASMS, HUMAN
- epidemiology, Poland (urban and rural): 860
- hormone metabolism: 860,885
  - review: 677
- pure adenoma, differential diagnosis: 886

METABOLISM (glycolysis and respiration)
- thymic, high- or low-leukemia mouse strains: 892

3-METHYLCHOLANTHRENE
- effect on microsomal enzymes, rat liver: 747, 748
- mammary tumors, pseudopregnant mouse: 760
- prostate tumors, hormone effects, rat: 766
- sarcoma, cytochemistry, rat: 736
  - tumor immunity, mouse or guinea pig: 734,758
- skin and s.c. tumors, mouse: 694,731,733,735
- thyroiditis, rat: 708

Mycoplasma
- antibody formation, leukemia: 778

NASOPHARYNX NEOPLASMS
- epidemiology, dogs and cats, Germany (Munich): 869
- inverted papilloma and squamous cell carcinoma: 884

NEOPLASMS
- growth regulation, mathematical models, review: 676

NEOPLASMS, EXPERIMENTAL
- Ehrlich-Lettré carcinoma (mouse), transplantation route and tumor virulence: 894
- L-M fibrosarcoma (mouse), sex difference: 891
- Novikoff hepatoma (rat), effect of carcinogens on nucleolar RNA: 743
- Sanford 2472 fibrosarcoma (mouse), transplantation route and tumor virulence: 894
- transplanted or autochthonous, immunity, mouse: 734
- Walker 256 carcinosarcoma (rat), karyotype: 874
- Yoshida sarcoma (rat), hormone stimulation: 762
  - and variants, karyotype: 872

NEOPLASMS, HUMAN
- cell lines, contact growth inhibition, species specificity: 893
- embryonic constituents, review: 688
- epidemiology,
  - Bulgaria (Plovdiv), TB mortality: 867
  - Germany (Düsseldorf): 854
  - Poland (Cracow and environs): 855

- NEOPLASMS, HUMAN (Contd.)
  - heredity, review: 689
  - and herpesvirus infection: 771
  - Hodgkin's disease with multiple primary carcinomas, immunology: 889
  - Immunology, review: 689
- NICOTINE METABOLITE (See also Tobacco)
  - cotinin, toxicity, rat: 718
- 4-NITROQUINOLINE-N-OXIDE
  - effect on nucleolar RNA, rat hepatoma: 743
- NITROSAMINE, DI-n-BUTYL-
  - liver and bladder tumors, guinea pig: 740
- NITROSAMINE, DIETHYL-
  - liver tumors, enzymes, rat: 751,752,753
    - RNA, rat: 751
    - tissue-specific antigens, rat: 752
  - transplacental carcinogenesis, rat: 737
- NITROSAMINE, DIMETHYL-
  - kidney tumors, enzyme metabolism, rat: 768
- NITROSAMINE, METHYLBUTYL-
  - esophagus tumors, rat: 738
- N-NITROSOGUANIDINE, N-METHYL-N'-NITRO-
  - reaction with protein, cell-free system: 703
- 1-NITROSO-2-IMIDAZOLIDINONE
  - effect on nuclear ultrastructure, yeast: 706
- N-NITROSOMETHYLUREA
  - effect on transformed or non-transformed cell lines: 712
- N-NITROSOMORPHOLINE
  - liver tumors, liver RNA and enzymes, rat: 751
- N-NITROSOSARCOSINE ETHYL ESTER
  - esophagus tumors, liver RNA and enzymes, rat: 751
- NITROSOUREA, METHYL-
  - stomach or pancreas tumors, guinea pig: 741
- NITROSOURETHAN, METHYL-
  - stomach or pancreas tumors, guinea pig: 741
- NUCLEIC ACIDS, DNA
  - benzpyrene or methylcholanthrene sarcoma, rat: 736
  - binding of carcinogens, rat liver: 756
    - review: 681
    - LSD, cell-free system: 704
  - enzymes mobilizing, structure, Shope fibroma virus: 841
  - Rous sarcoma virus-infected normal cells: 825
  - SV40-infected cells: 830,831,832
- NUCLEIC ACIDS, RNA
  - benzpyrene or methylcholanthrene sarcoma, rat: 736
  - effect of carcinogens, rat liver: 743,751
  - Newcastle disease and avian myeloblastosis, hybridization, normal cells: 801
  - Rous sarcoma virus, physical properties: 826
  - transfer, ethionine liver carcinogenesis, rat: 750

- OCCUPATIONAL DISEASES
  - dust inhalation, lung cancer risk, Japan: 715
- OPIUM
  - smoking, upper respiratory cancer, Cambodia: 862
- OVARY NEOPLASMS
  - epidemiology, Israel: 861
  - familial (mother and daughter): 895
- OVARY NEOPLASMS (Contd.)
  - incidence after partial hysterectomy: 895

- PANCREAS NEOPLASMS
  - induction
    - methylbutylnitrosamine, rat: 738
    - methylnitrosourea, guinea pig: 741
    - methylnitrosourethan, guinea pig: 741
- PENIS NEOPLASMS
  - epidemiology, India (southern), and circumcision: 859
- PETROLEUM
  - crude or refined, benzpyrene levels: 707
- PHAGOCYTOSIS
  - lung macrophages, effect of cigarette smoke and sulfhydryl agents, rabbit: 721
- PHENYLBUTAZONE
  - leukemogenesis, child: 709
- PHOSPHOLIPIDS
  - effect on methylcholanthrene carcinogenesis, mouse: 735
- PITUITARY
  - prolactin, effect of dimethylbenzanthracene, rat: 767
- POLYMERS
  - plastic, s.c. tumors, mouse: 732
- PREGNANCY
  - pseudo-, mammary carcinogenesis, mouse: 760
  - transplacental diethylnitrosamine carcinogenesis, rat: 737
  - wastage, and childhood leukemia: 864
- PROPYL GALLATE
  - effect on benzpyrene carcinogenesis, mouse: 730
- PROSTATE NEOPLASMS
  - induction, methylcholanthrene, hormone effects, rat: 766
- PROTEINS
  - reaction with nitrosoguanidine derivative, cell-free system: 703

- RADIATION
  - effect on benzpyrene induction of liver enzymes, rat: 742
  - exposure, and childhood leukemia: 864
- RADIATION CARCINOGENESIS
  - lung, animal, review: 683
  - possible, spontaneous nasopharynx cancer, dogs (Germany): 869
  - thyroid cancer, review: 683
- RADIATION LEUKEMOGENESIS
  - dose-response relationship, mouse: 696
  - ^{90}Sr, swine, virus-like particles: 695
    - ^{90}Y, leukemoid reaction, rat: 698
  - virus isolation, mouse: 787,789
- RADIOISOTOPES
  - ^{90}Sr, leukemogenesis, swine, virus-like particles: 695
    - milk: 697
    - ^{90}Y, leukemoid reaction and other tumors, rat: 698
- RECTUM NEOPLASMS
  - rectocolitic polyps, malignant transformation: 876,896
- RESPIRATORY TRACT
  - carcinogen distribution, hamster: 717

IRATORY TRACT NEOPLASMS
- pidemiology, Cambodia: 862

VARY GLAND NEOPLASMS
- ith Hodgkin's disease, multiple skin tumors and stomach cancer, immunology: 889

TISSUE (See also under Injuries)
- ung, and lung cancer, review: 683

- hromatin, variations with menstrual cycle, normal women: 871
- ifference, tumor growth, mouse: 891

- ycasin metabolism, fetal and newborn rat: 724

CARCINOGENESIS
- rsenic-containing drugs, human: 725
- enzanthracene derivatives, rat: 727
- enzo(a)acridines or benzo(c)acridines, structure-activity relationship, mouse: 728
- enzpyrene, mouse: 729,730,731
  - rat: 736
- imethylbenzanthracene, mouse: 731,739
  - hamster cheek pouch: 726
  - tumor immunity, guinea pig: 758
- ethylcholanthrene, mouse: 694,731,733,735
  - rat: 736
  - tumor immunity, guinea pig: 758
- lastics, mouse: 732

NEOPLASMS
- rom chromoblastomycosis: 881
- elanoma, epidemiology, England (south-western): 863
  - siblings: 888
- elanosarcoma, from varicose ulcer: 880
- ultiple, with Hodgkin's disease and stomach cancer, immunology: 889

ACH
- bomasum, possible site of bovine leukosis virus invasion: 802

ACH NEOPLASMS
- pidemiology, peptic ulcer: 879,897,898
- ith Hodgkin's disease and multiple skin tumors, immunology: 889
- nduction, methylnitrosourea, guinea pig: 741
  - methylnitrosourethan, guinea pig: 741

HYDRYL GROUPS
- ysteine or glutathione, effect on alveolar macrophage response to tobacco smoke, rabbit: 721

ERY
- ursectomy, effect on Marek's disease, chicken: 818
- ryogenic, effect on adenovirus-induced tumors, hamster: 835
- astrectomy (ulcer), stomach cancer: 897,898
- artial hysterectomy, ovarian tumor incidence: 895

MUS
- lycolysis, high- or low-leukemia mouse strains: 892
- adiation-induced atrophy, mouse: 696

THYROID DISEASES
- Hashimoto's thyroiditis, malignant transformation (lymphoma): 882
- thyroiditis, induction, methylcholanthrene, rat: 708

THYROID NEOPLASMS
- epidemiology, radiation exposure, review: 682

TOBACCO
- alkaloid, cotinin, toxicity, rat: 718

TOBACCO SMOKE
- carcinogenesis, exptl., review: 675
- distribution, human lung preparation: 720
- effect on alveolar macrophages, interaction with sulfhydryl agents *in vitro*, rabbit: 721
- gas phase, analysis of oily fraction: 719
- tar, lymphoma, mouse: 722

TOBACCO SMOKING
- bronchus cancer, Africa (Rhodesia): 723
- health hazards, review: 690
- ulcer and lung cancer: 879

TOXICITY
- 4-aminobiphenyl, dog: 764
- herbicides, animal: 764

TRAUMA (See Injuries)

ULCER, PEPTIC
- stomach and other cancer: 879,897,898

UREA, 3-(3,4-DICHLOROPHENYL)-1-METHOXY-1-METHYL- (Linuron: herbicide)
- toxicity, animal: 764

URETHAN
- leukemia, virus isolation, mouse: 787
- lung tumors, ultrastructure, mouse: 716

VASCULAR DISEASES
- varicose ulcer, malignant transformation (melanosarcoma): 880

VASCULAR NEOPLASMS
- glomangioma, hereditary (father and daughter): 887

VIRAL CARCINOGENESIS
- mechanism, review: 684,691

VIRUS
- diseases, and childhood leukemia: 864
- herpes, infection, human cancer: 771,773
- influenza, infection, lung cancer, review: 683
- Marek's disease (avian)
    - immunology, chicken: 818,823,824
      - rabbit: 823
  - survival, litter and droppings, chickens: 819
  - transmission, chickens: 820,821,822
- polyoma
  - effect of hydroxyurea, normal cells: 828
  - tumor and host immunity, hamster: 829
- possible positive cells ("halo cells"), premalignant cervix lesion: 774
- Shope fibroma, DNA enzyme structure: 841
- Shope papilloma, antigen production, normal cells: 827
- SV40
  - DNA kinetics *in vitro*: 830,831,832
  - release, fused transformed cells: 833
    - transformed cells: 837

VIRUS (Contd.)
  SV40 (Contd.)
    transformation, mechanism, hamster cells: 834
    tumor growth after cryosurgery, hamster: 835
      induction, role of viral genome, hamster, review: 685
      vaccine preparation, method, hamster: 836
  transformed cell lines, effect of nitrosomethylurea: 712
VIRUS, ADENO
  malignant transformation, mechanism, review: 686
  type 7
    tumor growth after cryosurgery, hamster: 835
      vaccine preparation, method, hamster: 836
VIRUS, LEUKEMIA/LYMPHOMA (See also under Leukemia, experimental)
  avian leukosis
    control, Hungary: 799
    immunization, adult or embryonic chickens: 798
    male reproductive tract, chicken: 797
  avian myeloblastosis
    RNA hybridization with Newcastle disease virus RNA, normal cells: 801
    structure and immunology, chicken and mammal: 800
  bovine leukosis
    abomasum as possible invasion site: 802
    control, Germany (Saxony): 817
      methods: 810
    epidemiology: 812
      France: 815
    genetic susceptibility: 813,814
    transmission: 803,804,805,806,807,808, 809,811,812
      review: 678
  Burkitt lymphoma (herpes-like), classification and morphology: 772,777
  canine
    lymphosarcoma, attempted transmission: 794
    mast cell leukemia, transmission: 793
    reticulum cell leukemia, isolation and transmission (tissue culture and mice): 792
  Friend (mouse)
    effect on erythropoiesis: 781
      immunity: 779,780
    interferon effects: 844
  Graffi (mouse)
    distribution, preleukemic or leukemic stages: 785
    host immunity: 845

VIRUS, LEUKEMIA/LYMPHOMA (Contd.)
  Gross (mouse), effect on immunity: 780
  guinea pig, isolation and properties: 786
  human
    attempted isolation: 775,777
    transmission, review: 678
  mechanism of action, review: 687
  Moloney (mouse)
    effect on immunity: 779
    immunoassay *in vitro*: 851
    interaction with Moloney sarcoma virus, normal cells: 795
  mouse
    erythroblastosis, cell response, mouse or rat: 847
    isolation and properties: 783,850
      radiation-induced leukemia: 787,789
      spontaneous reticulum cell tumor: 787
      urethan- or dimethylbenzanthracene-induced leukemia: 787
    pathology, review: 692,693
    polycythemia virus, effect on erythropoiesis: 781
  particles resembling, radiation-induced leukemia, swine: 695
  Rauscher (mouse)
    attenuation, methods: 848
    comparison to L cell agent: 783
    effect on erythropoiesis: 781
    enzyme metabolism: 784
    host immunity: 779,780,782,852
    immunoassay *in vitro*: 851
    In vitro pathogenicity: 849
    morphology: 846
  reovirus type 3, lymphoma, mouse: 788
VIRUS, MAMMARY TUMOR (See also Mammary neoplasms)
  genetic transmission, mechanism, mouse: 838
  host and tumor immunity, mouse: 840
  immunology and hybrid resistance, mouse: 839
  mechanism of action, review: 687
VIRUS, SARCOMA
  human, isolation (fibrosarcoma or osteosarcoma) and pathogenicity (hamster): 770,776
  mechanism of action, review: 687
  Moloney (mouse)
    interaction with Moloney leukemia virus, normal cells: 795
    propagation, rat or hamster cells: 796
  Rous (chicken)
    DNA induction, normal cells: 825
    immunology, chicken and mammal: 800
    pathology, species differences: 843
    propagation, rat or hamster cells: 796
    RNA, physical properties: 826
VITAMIN E
  α-tocopherol, effect on benzpyrene carcinogenesis, mouse: 730

Erratum: Abstract No. 69-116, Volume 7, Issue 1: journal reference should read *Virology* 34:134-140, 1968.

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

616.99405
CAR

Vet Med

MAY 1969
Abstract Nos. 899-1126

Vol. 7
No. 5

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

Volume 7, Number 5
May, 1969
(Submitted for Publication
February, 1969)

Abstract Numbers
899-1126

	Page
Review	191
Physical Carcinogenesis	194
Chemical Carcinogenesis	199
Viral Carcinogenesis	210
Epidemiology and Biometry	225
Miscellaneous	236
Author Index	i
Subject Index	iv

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a national program of cooperative research in cancer, is establishing a means whereby information in the field of carcinogenesis will be coordinated and made available. The information to be included will be obtained from the National Cancer Institute, other governmental agencies, and non-governmental research institutions.

The issuing of *Carcinogenesis Abstracts* under the auspices of the National Cancer Institute will provide a central source for current abstracting of the carcinogenesis literature being published throughout the world. This will help facilitate an integrated and cooperative program of investigation in this area. The growing number of publications in the area of carcinogenesis makes imperative the availability of an appropriate abstracting service so that investigators may be apprised of progress with a minimum of delay. It is our desire to provide the investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most recently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. If the journal is not covered by *Index Medicus*, then the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

admin.	administered, administration	mg	milligram(s)
av.	average	min.	minute(s)
C	curie(s)	ml	milliliter(s)
mC	millicurie(s)	mm	millimeter(s)
µC	microcurie(s)	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
conc.	concentration	NIH	National Institutes of Health, USA
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	QO_2	oxygen quotient
DNase	deoxyribonuclease	PFU	plaque forming unit
e.g.	for example	ppm	parts per million
FFU	focus forming unit	pt.(s)	patient(s)
g.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
g	gram(s)	RES	reticuloendothelial system
µg	microgram(s)	resp.	respectively
Hb	hemoglobin	RNA	ribonucleic acid
i.a.	intra-arterial	RNase	ribonuclease
ID_{50}	median infectious dose	soln.	solution
inj.	injected, injection(s)	s.c.	subcutaneous
inoc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
i.p.	intraperitoneal	x	times (e.g. x 3/wk.)
I.U.	international unit(s)	U	unit
i.v.	intravenous	UV	ultraviolet
kg	kilogram(s)	vol.	volume
LD_{50}	median lethal dose	VA	Veterans Administration
M	molar, mole(s)	wt.	weight
mM	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
µM	micromole(s)		
max.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

Af.	Afrikaans	E.	English	Hun.	Hungarian	Lith.	Lithuanian	Ser.	Serbo-Croatian
Ar.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
Bul.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
Ch.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
Cz.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
Dan.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
Dut.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

69-899 THE APPLICATION OF LABELED ANTIBODY TECHNICS IN STUDYING CELL ANTIGENS. (E.) Mellors, R. C. (Cornell U. Med. Coll., New York, N. Y.). Cancer Res. 28(7):1372-1381, 1968. (103 references)

The use of immunofluorescence methods for the detection of infectious agents, foreign or endogenous antigens and specific antibodies and for the study of diseases of unknown etiology (including human cancer) is discussed.

69-900 GENETIC ORIGIN OF TUMOR ANTIGENS. (E.) Boyse, E. A. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.), L. J. Old, E. Stockert and N. Shigeno. Cancer Res. 28(7): 1280-1287, 1968. (36 references)

The current status of knowledge of the genetic control of tumor cell antigens is summarized, with particular reference to studies of the virus-induced mouse leukemias.

69-901 SEROLOGIC APPROACHES TO THE STUDY OF CANCER IN ANIMALS AND IN MAN. (E.) Old, L. J. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.), E. A. Boyse, G. Geering and H. F. Oettgen. Cancer Res. 28(7):1288-1299, 1968. (86 references)

Recent studies on the immunology of experimental tumors (induced by chemicals or DNA or RNA viruses) and human cancer (the authors' studies of immune reactions of African or American pts. with cancer) to a Burkitt lymphoma cell line are discussed.

69-902 SEROLOGIC SURVEYS FOR VIRAL ANTIBODIES IN CANCER PATIENTS. (E.) Rowe, W. P. (NIH, Bethesda, Md.) and A. M. Lewis, Jr. Cancer Res. 28(7):1319-1320, 1968. (18 references)

At least 30 distinct types of human adenovirus, each producing a number of T antigens, are known; at least 9 serotypes belonging to 3 subgroups have some experimental tumor-inducing potential. Several methods of detecting antibodies to adenovirus T antigens in cancer pts. are discussed (an indirect fluorescent antibody method proved more sensitive than complement fixation). Seroepidemiologic studies of this type have not yet proved of value, because of the high incidence of antibodies in control subjects.

69-903 SUMMARY: EXPERIMENTAL TUMOR IMMUNOLOGY: AND SEARCH FOR TUMOR-SPECIFIC ANTIGENS IN HUMAN TUMORS OF POSSIBLE VIRAL ORIGIN. (E.) Stetson, C. A. (New York U. Sch. Med., N. Y.). Cancer Res. 28(7):1325, 1968. (No references)

A summary of the discussion following presentation of several papers at a symposium.

69-904 NEOPLASMS AND IMMUNITY. (Pol.) Stelmachowska, A. (Inst. Immun. Exper. Ther., Polish Acad. Sci., Wroclaw, Poland) and A. Harłozińska. Postepy Hig. Med. Dosw. 22(5): 683-725, 1968. (298 references)

The antigenic specificity of different virus- and chemically-induced tumors, resistance phenomena encountered in experimental tumors and the immunotherapy of different human tumors (with special emphasis on active and passive immunity, effect of immune sera and immunologically competent cells and nonspecific stimulation of the RES) are extensively reviewed.

69-905 HODGKIN'S DISEASE: ETIOLOGY AND EPIDEMIOLOGY. (E.) Gibson, S. R. McGill Med. J. 37(3):162-172, 1968. (27 references)

Recent studies on the epidemiology of Hodgkin's disease are reviewed. The increased mortality rate from this disease (a 2.5-fold increase from 1921 to 1951) was tentatively attributed to more accurate diagnosis, as was the significantly higher mortality rate in white pts. than in nonwhite pts. The bimodal distribution of Hodgkin's disease (peaks at ages 25-29 and 70-74) suggested 2 different etiologies; the male:female ratio at ages 15-34 was about 1:1, but at age 50 and over it was 2:1. A familial risk was also noted. Hodgkin's disease was also more frequent in groups of higher socioeconomic and educational status, but the significance of these findings could not be determined.

69-906 RECENT CONCEPTS OF CANCER PREVENTION. (E.) Raven, R. W. (Roy. Cancer Hosp., London). Progr. Exp. Tumor Res. 10:133-162, 1968. (95 references)

Removal of exogenous carcinogens from the environment, the recognition and control of abnormal body conditions responsible for tumor induction (including control of endogenous carcinogens), methods of identification of premalignant lesions and noninvasive cancer, and the prevention of recurrence and metastasis are discussed.

69-907 THE SYRIAN GOLDEN HAMSTER IN CHEMICAL CARCINOGENESIS RESEARCH. (E.) Homburger, F. (Bio-Res. Inst., Cambridge, Mass.). Progr. Exp. Tumor Res. 10:163-237, 1968. (234 references)

Tumor induction in the skin, flank organs, s.c. and mesenchymal tissues, cheek pouches, respiratory and g.i. tracts, male and female genital organs, mammary glands, liver, kidneys, pituitary and thyroid of the Syrian golden hamster is discussed.

69-908 LYMPHOID TUMORS IN AMPHIBIA: A REVIEW. (E.) Balls, M. (U. East Anglia, Norwich, England) and L. N. Ruben. Progr. Exp. Tumor Res. 10:238-260, 1968. (61 references)

The properties of the lymphomas and lymphosarcomas of amphibian origin (6 species) are discussed. Four of the tumors, apparently induced by subcellular factors (viruses in 2 cases, bacteria or a bacterium-associated factor in 1 case), are transferable to adults of 15/15 amphibian species tested; another tumor (not transmitted by cell-free extracts) is confined to the axolotl.

69-909 CELLULAR MEMBRANES AND TUMOR BEHAVIOR: A NEW HYPOTHESIS. (E.) Wallach, D. F. H. (Massachusetts Gen. Hosp., Boston). Proc. Nat. Acad. Sci. USA 61(3):868-874, 1968. (62 references)

It is hypothesized that a carcinogenic agent acts to introduce an inappropriate protein into the cell membrane (replacing or adding to normal membrane components), which leads to the modification of membrane morphology and function (antigenicity, permeability, electrokinetic properties, contact relationships, etc.). More distal effects may include changes in the binding of substrates (messenger RNA, lipids, metabolic intermediates), and in the functions of membrane-associated enzymes. Defects with no immediately obvious relationship to the cell membrane (being several steps removed) include abnormal control of fatty acid synthesis and glycolysis.

69-910 SCIENTIFIC EXHIBIT: CANCER FAMILIES, A HEREDITARY CANCER SYNDROME. (E.) Lynch, H. T. (Creighton U. Sch. Med., Omaha, Neb.), A. J. Krush, E. J. Slowinski and M. F. Marsh. Nebraska Med. J. 53(11):524-530, 1968. (17 references)

The hereditary transmission of endometrial cancer (associated with the triad of diabetes mellitus, obesity and hypertension) and cancer of the colon is discussed. The "cancer family" syndrome includes an increased incidence of adenocarcinoma, especially of the colon and endometrium, an increased frequency (20% or more) of multiple primary malignant tumors, early age at onset and autosomal dominant inheritance. The authors' studies of 6 American "cancer families" (including Warthin's "Family G," studied since 1913) are summarized.

69-911 EXPERIMENTAL DIAPLACENTAL CARCINOGENESIS. (Ger.) Mohr, U. (Inst. Exp. Path., Heidelberg, Germany). Langenbeck. Arch. Klin. Chir. 321(4):273-279, 1968. (8 references)

Diethylnitrosamine carcinogenesis (trachea, lung, liver, kidney) in the offspring of hamsters, mice and rats treated during pregnancy is briefly reviewed.

69-912 IMMUNITY IN CARCINOGENESIS. (I) TUMOR INDUCTION BY IRRADIATION. (Jap.) Yasuhira, K. (Kyoto U., Japan). Bull. Chest Dis. Res. Inst. Kyoto U. 1(1-2):50-56 & 38, 1968. (60 references)

Studies in mice with radiation-induced tumors suggested that the tumors developed during recovery from radiation injury. Radiation suppression of antibody formation may permit further growth of radiation-transformed cells containing newly formed tumor antigens.

69-913 CRANIAL AND INTRACRANIAL CARTILAGINOUS TUMOURS. (E.) Berkmen, Y. M. (U. Cincinnati Med. Ctr., Ohio) and E. S. Blatt. Clin. Radiol. 19(3):327-333, 1968. (66 references)

Three pts. are added to the 112 recorded cases of connective tissue tumors of the skull and intracranial structures (96/116 tumors were benign). The incidence was about 0.16% of all intracranial space-occupying lesions. The tumors developed at all ages, but the peak age was 20-30 except in the pts. with malignant tumors (most were in the 40-60 age group); no sex predilection was noted. Possible traumatic causation was reported for 4 pts. It is suggested that these tumors develop from cartilaginous rests in structures arising from the chondrocranium, or from the dura or arachnoid villi. Benign chondromas can develop into malignant chondrosarcomas. Problems of differential diagnosis are discussed.

69-914 Nicotine: Pharmacology and Toxicology of Tobacco Smoke. (Ger.) Schievelbein, H. (Ed.) (U. Munich, Germany). Stuttgart, Georg Thieme Verlag, 1968, 336 pp. DM 52--.

In addition to chapters discussing the experimental and human pharmacology and toxicity of tobacco smoke and its constituents, there are 2 chapters on the effects of smoking on the respiratory tract (pp. 57-61 and 199-205; 20 and 42 references, resp.), 2 on tobacco carcinogenesis in animals (pp. 62-69 and 293-320; 41 and 159 references, resp.), 1 on bladder cancer in man (pp. 242-249; 41 references) and 3 on respiratory tract diseases including cancer (pp. 99-119, 120-153 and 206-229; 259 references in all).

69-915 PLEURAL FIBROCALCIFIC PLAQUES AND ASBESTOS EXPOSURE. (E.) Meurman, . O. (Cent. Hosp., Kuopio S., Finland). *Environ. Res.* 2(1):30-46, 1968. (48 references)

Recent studies of occupational and non-occupational (environmental) asbestos exposure in relation to benign pleural calcification and the increasing incidence of pleural mesothelioma are discussed. It is emphasized that these studies demonstrate only an association between asbestos exposure and pleural calcification (usually not combined with pulmonary changes or pneumoconiosis), not a definite cause-effect relationship.

69-916 *Textbook of Virology, 5th Ed.* (E.) Rhodes, A. J. (U. Toronto, Canada) and C. E. Van Rooyen (Eds.) Baltimore, Williams & Wilkins, 1968, 966 pp.; $33.50.

Chapter 10 of Section 1 (pp. 146-167; 135 references) deals with the tumor-inducing viruses, with particular reference to their mechanisms of action. Chapters 6 and 7 of Section 2 (pp. 349-354 and 354-356; 32 and 13 references, resp.) are discussions of the papilloma and related viruses, including polyoma and vacuolating viruses (such as SV40). Classification of these tumor-inducing viruses into a single group (papovaviruses) is recommended. Chapters 8 and 9 of Section 3 (pp. 356-379; 50 references) are discussions of the adenoviruses, including the tumor-inducing human adenoviruses.

69-917 HISTORY OF CHEMICAL CARCINOGENESIS: SOME PROSPECTIVE REMARKS. (E.) Shimkin, M. B. (Temple U., Philadelphia, Pa.) and V. A. Triolo. *Progr. Exp. Tumor Res.* 11: 1-20, 1969. (47 references)

The earliest papers on various types of exogenous chemical carcinogenesis are discussed, beginning with the description of scrotal cancer in chimney sweeps in 1775 (Pott). Tobacco carcinogenesis (lip cancer in chronic pipe smokers) was described in 1795 (Soemmerring) and bladder tumors in aniline dye workers in 1895 (Rehn); the discovery of 2-naphthylamine as a bladder carcinogen in 1938 (Hueper et al.) led to its legal prohibition. The carcinogenic effects of aminoazo dyes were reported in 1906 (Fischer-Wasels); other important papers on the aminoazo compounds were published in 1924 (Schmidt) and 1933 (Yoshida). Papers on radiation carcinogenesis in man appeared as early as 1902 (Feygin); the first paper on X-ray carcinogenesis in animals was published in 1908 (Clunet). Yamagiwa and Itchikawa published their first English paper on coal tar carcinogenesis in 1918; the first paper on polycyclic hydrocarbons by Kennaway and colleagues appeared in 1937. The carcinogenic effects of N-2-fluorenylacetamide were discovered in 1941 (Wilson et al.), leading to the abandonment of this compound as an insecticide. Urethan carcinogenesis was discovered in 1943 (Henshaw et al.). The recent discoveries of the carcinogenic mycotoxins, aflatoxin (1961; Wood and Larson) and cycasin (Laqueur et al., 1963) led to the suggestion that the g.i. tumors observed by Fibiger in nematode-infested rats in a sugar refinery (1913) might be reinterpreted as having been caused by a mycotoxin present in the sugar, or a carcinogenic or tumor-promoting substance elaborated by the nematodes or their intermediate hosts.

See also abstract nos.: 1100,1101,1102,1103

69-918 MELANOMA OF SKIN. CLINICAL ACCOUNT OF A SERIES OF 209 MALIGNANT MELANOMAS OF SKIN. (E.) Cameron, J. R. J. (Roy. Coll. Surg., Edinburgh). J. Roy. Coll. Surg. Edinb. 13(5): 233-254, 1968.

Clinical data on 209 pts. (most in the 30-50 age group; 9/209 under 20) seen between 1945 and 1967 are discussed. Tumor sites were the leg in 40.5%, head and neck in 30%, trunk in 17%, arm in 12%, subungual areas in 2.5% and unknown in 0.5% (1 pt.). Definite histories of a mole at the site of the melanoma and definite histories of trauma were reported by 85% and 39% (177 and 90 pts.), resp. The association of injuries and melanoma was studied in 33 pts.; 16 reported no histories of trauma and 17/33 reported 1 or more traumas, including friction from clothing (3 pts.) and attempts to remove the mole (at least 11 pts.). Many pts. with premalignant facial lesions had tried to conceal them by cosmetics. The female preponderance in the entire group (131 females, 78 males), reversing the sex ratio in pts. with skin cancer, suggested hormonal influences. The disease progressed rapidly during and after pregnancy in 3 women. One family history is reported: (1) a 5-yr.-old boy with metastasizing prepubertal melanoma, without recurrence about 20 yr. after treatment; (2) a child of this pt., with a skin blemish of unknown type; and (3) the mother of this pt., treated for a melanoma and, 6 yr. later, unilateral breast carcinoma (neither tumor recurred).

69-919 TRAUMATIC CARCINOMA OF THE SKIN. (Ger.) Hess, P. Berufsdermatosen 16(5): 249-260, 1968.

Clinical data on 2 women and 18 men (age 27-58 yr.) with traumatic skin tumors are given. The 6 carcinomas (1 basal cell, 5 squamous cell) arising after mechanical injuries showed latent periods of 1-8 mo. in 4/6, 3 yr. in 1/6 and 18 yr. in 1/6. The 8 carcinomas (5 basal cell, 3 squamous cell) arising from burn scars showed latent periods of 7-9 mo. in 2/8, 2-5 yr. in 3/8, 7-8 yr. in 2/8 and 33 yr. in 1/8. One pt. who had undergone X-ray epilation for tinea capitis in childhood (age 12 yr.) developed basal cell carcinoma of the scalp 43 yr. later. In 1 pt., 2 squamous cell carcinomas of the face were attributed to combined chemical and thermal injury (burns from hot tar) 9 yr. previously. The other 4 pts. had squamous cell carcinoma (2) or premalignant melanosis (2) of occupational origin (sun and heat exposure in 1/4; 3/4 worked in a tar factory). The 2 pts. showing the longest latent periods developed carcinomas in areas of "tight atrophy," which is regarded as the decisive cocarcinogenic factor.

69-920 POST-TRAUMATIC CARCINOMA OF THE SKIN. (It.) Depaoli, M. (City Hosp., Ivrea, Italy) and A. Baldi. Minerva Derm. 43(6): 270-275, 1968.

A 37-yr.-old man sustained a localized injury to 1 shoulder (from a falling tree branch), which removed a 4 x 5 cm area of the skin. Despite local antiseptic therapy the wound did not heal and later became ulcerated; 4 mo. later, biopsy of the ulcerated area showed a sclerodermiform, undifferentiated basal cell carcinoma. The tumor corresponded precisely to the injured area and was surrounded by normal skin.

69-921 CARCINOMA OF THE OESOPHAGUS AFTER LYE CORROSION. REPORT OF A CASE IN A 15-YEAR-OLD KOREAN MALE. (E.) Kinnman, J. (Nat. Med. Ctr., Seoul), H. I. Shin and P. Wetteland. Acta Chir. Scand. 134(6):489-493, 1968.

Examination of 20,282 biopsy specimens from about 18,200 Korean pts. seen from December, 1958 through August 15, 1967 demonstrated malignant tumors in 1714/7632 males and 1949/10,558 females. Cancer of the g.i. tract (excluding mouth and pharynx) was seen in 632/1714 males and 337/1949 females; esophageal carcinoma (usually squamous cell) was seen in 59 males and 8 females, accounting for 9.3% and 2.4%, resp., of all g.i. tumors. The male preponderance in these pts. with esophageal cancer (male:female ratio of 7.4:1) was highly significant, but the reasons for this sex difference could not be determined. The av. age in these pts. was 52 yr.; the youngest pt. without a known contributing cause was a 20-yr.-old male. None of these 67 pts. had histories of lye ingestion. Examination of 284 cases of lye corrosion of the esophagus seen at this center from 1961-1966 disclosed 1 case of well-differentiated squamous cell carcinoma of the esophagus (with a tracheo-esophageal fistula), in a 15-yr.-old boy who had swallowed lye 12 yr. previously. This seems to be the youngest reported case of esophageal carcinoma in a male.

69-922 NASOPHARYNGEAL CARCINOMA IN CANADIAN BUSH PILOTS. (E.) Andrews, P. A. J. (Sudbury Gen. Hosp., Canada) and L. Michaels. Lancet 2(7559):85-87, 1968.

Nasopharyngeal carcinoma was seen in 3 men who had worked as bush pilots in northern Canada for many yr. In 1/3, who had been flying for at least 10 yr. (total flying time unknown), the tumor was relatively small, appearing at the orifice of 1 eustachian tube. This pt. was also a miner. The other 2 men had been flying for more than 25 yr. (total flying time over 10,000 hr.); in these pts. the tumors were too advanced to determine the site of origin, but 1 tumor later invaded through the ear drum, indicating growth along the eustachian tube. Bush pilots in Canada usually fly small, non-pressurized planes, with many ascents and descents in short flights, usually below an altitude of 3000 ft. (900 m); the possible role of chronic irritation of the eustachian tubes from continual pressure changes (perhaps permitting the focal action of inhaled carcinogens such as cigarette smoke or gasoline vapor) is discussed.

69-923 BLOOD CESIUM-137 PROJECT 1967. (E.) Yamagata, N. (Inst. Pub. Health, Tokyo). Health Phys. 15(3):276-280, 1968.

The ratio of ^{137}Cs to potassium in the body (related to the fallout rate and the accumulated deposition of ^{137}Cs in the body) was measured in blood samples from normal men from several nations, collected in July-December, 1967. This ratio (expressed as μμC ^{137}Cs/g K) was significantly higher in men from 4 European cities located at latitude 40-45° N (64-79) than in men from 3 South American cities at latitude 13-35° S (29-32). The ratio in men from Lagos, Nigeria (6° N) was 59. The predicted ratios of ^{137}Cs/K in samples from South America and Nigeria were only 25-50% of the observed values (based on the geographical variations in accumulated ^{90}Sr deposits through 1965); the discrepancies were tentatively attributed to extensive international redistribution of marketed foodstuffs and other ecological factors of international cooperation.

69-924 SOME ASPECTS OF THE EFFECTS OF AGE AND OF CALCIUM INTAKE ON STRONTIUM-90 METABOLISM IN MAN. (E.) Spencer, H. (VA Hosp., Hines, Ill.), J. Samachson, E. P. Hardy, Jr. and J. Rivera. Health Phys. 15(6):499-504, 1968.

Balances of ^{90}Sr (from food levels resulting from fallout) and calcium (Ca) were studied in 2 groups of young subjects (av. age about 20) and 2 groups of older subjects (av. age 44.6-49.3 yr.) on low- or high-Ca diets (av. intake 179-213 or 1141-1718 mg/day, resp.) in a metabolic ward. In the younger subjects, urinary Ca was almost 2-fold higher on the high-Ca diet (supplemented by milk) than on the low-Ca regimen. Fecal Ca accounted for 59% and 73% of the intake, resp., while the Ca balance was -18 and +341 mg/day, resp. Urinary Ca in the older subjects showed little variation from the low-Ca to the high-Ca regimens (av. 99 and 115 mg/day, resp.); the Ca balance was -121 and +144 mg/day, resp. In all groups, fecal ^{90}Sr accounted for 85-93% of the ingested ^{90}Sr. The results suggested that age and Ca intake affected the discrimination between Sr and Ca by the body. Comparison of the observed ratios of urine/diet and stool/diet for the calculation of dietary ^{90}Sr levels in these subjects suggested that fecal ^{90}Sr and Ca levels were reliable methods for the calculation of dietary ^{90}Sr levels and ^{90}Sr/Ca ratios in subjects of different ages on different Ca intakes.

69-925 CHRONIC EFFECTS FROM RADIUM-226 BODY BURDEN ON HUMAN CHROMOSOMES CULTURED IN VITRO. (E.) Brown, C. D. (Albany Med. Coll., Union U., N. Y.), I. H. Porter and J. J. Gabay. New York J. Med. 68(20):2641-2647, 1968.

Cultured peripheral WBC from a man exposed occupationally for 12 mo. to ^{226}Ra and ^{210}Po were examined up to 200 mo. after radiation exposure (RE). The ^{226}Ra body burden (determined by whole-body and expired breath counts) was 0.31 μC during the RE period and fell thereafter to 10-30% of the max. permissible occupational count (skeletal body burden of 0.1 μC). The av. cumulative bone dose also fell during this time. In cultured WBC taken during the first 134 mo. after RE, the number of 46-chromosome cells was 14% below normal. Some of the 46-chromosome cells were pseudodiploid, with an extra chromosome of the Group C type. Most chromosomal abnormalities were translocations and acentrics; no rings or dicentrics were noted (confirming the low radiation dosage). The proportion of abnormal cells fell from 18.9% at 137 mo. after RE to 5.5% at 166 mo. after RE; no gross chromosomal abnormalities were seen in cells obtained 200 mo. or more after RE. This man was clinically healthy and had 4 children; the oldest (born about 3 yr. after RE) died of congenital heart defects, 1/4 had an undescended testis, 1/4 had a functional systolic heart murmur and a herniated hydrocele, and 1/4 (the youngest) was normal.

69-926 BIOLOGICAL DOSIMETRY IN ATOMIC BOMB SURVIVORS. (E.) Sasaki, M. S. (Tokyo Med. Dent. U., Japan) and H. Miyata. Nature (London) 220(5173):1189-1193, 1968.

The frequencies of chromosomal aberrations were studied in 72-hr. phytohemagglutinin + thymidine cultures of lymphocytes from 51 subjects exposed to the Hiroshima atomic bomb about 22 yr. previously (age 1-58 yr.), and in cultures from 13 non-exposed control subjects in the same age groups (23-36 and 71-80 yr.). Subjects with histories of other radiation exposure (except routine chest X-ray) were excluded. The frequency of cells with unstable chromosome aberrations (Cu; including rings and acrocentrics) was 0.41% in control cultures and about 1% in cultures from exposed pts.; the frequencies of cells with stable chromosome aberrations (Cs) were 0.07% and 0.40%, resp. Most of the Cu cells were in their first division since radiation exposure. The frequency of Cu type aberrations decreased with time after radiation exposure, but the frequency of Cs aberrations remained stable. The ratio of Cs cells to Cs + normal cells, and the number of dicentrics + rings/Cu cell, decreased with decreasing radiation exposure. Equations to determine the total body absorbed radiation dose (for X-ray doses under 600 rads) from the frequencies of chromosomal aberrations were developed.

69-927 EPIDEMIOLOGICAL STUDY ON LUNG CANCER AMONG A-BOMB SURVIVORS IN HIROSHIMA.

(E.) Shimizu, K. (Hiroshima U., Japan). Hiroshima J. Med. Sci. 16(3-4):241-253, 1967.

Lung cancer mortality/100,000 in males and females in all of Japan was 1.9 and 0.8, resp., in 1950, compared to 11.45 and 4.09, resp., in 1963. In Hiroshima Prefecture, mortality rates were 2.8 and 1.3, resp., in 1950 and 9.4 and 4.3, resp., in 1962. In the city of Hiroshima, mortality rates peaked in 1958 (13.8 and 5.4, resp.), then fell gradually (8.0 and 4.2, resp., in 1965). In atomic bomb survivors, the incidence increased markedly from 1955-1959, then fell slightly; the peak incidence was about 1 yr. earlier and the subsequent decline greater in women than in men. The annual lung cancer incidence after 1961 remained about the same in exposed persons, but further follow-up studies until 1975 are recommended. In 81/89 evaluable atomic bomb survivors with lung cancer (47 men, 34 women), the mean age at onset in men and women was 63.1 and 57.5, resp., compared to 56.1 and 50.9, resp., in nonexposed persons. In exposed persons, the lung cancer incidence/100,000/yr. increased with radiation exposure (3.5 in those exposed at over 2500 m from the hypocenter; 23.5 in those exposed within 1000 m; 18/47 men and 24/34 women had been exposed at 2000 m or less) and was also high in those who entered the city within the first few days. The sex difference was small in exposed persons; in 1960, the incidence in women was 1.4-fold higher than in man. The lung cancer incidence in exposed persons was higher in those exposed in the northwestern and northeastern areas of the city (33.7 and 33.2/100,000, resp.) than in those exposed in the southeastern and southwestern areas (21.3 and 19.5, resp.). In the 81 exposed pts. available for follow-up, no significant contribution of environmental factors, including smoking, was noted (2.1% of the men were heavy smokers and 21.3% smoked 11-20 cigarettes/day; 42.6% of the men and 20.5% of the women were light smokers; 17% and 70.7%, resp., were nonsmokers).

69-928 SYSTEMIC ABSORPTION OF POLONIUM-210 INHALED IN CIGARETTE SMOKE. (E.)

Little, J. B. (Harvard U. Sch. Pub. Health, Boston, Mass.) and R. B. McGandy. Arch. Environ. Health (Chicago) 17(5):693-696, 1968.

Blood levels of ^{210}Po were studied in 4 men and 2 women who had smoked heavily (1-1.5 packs/day) for several yr., before and up to 89 days after a sudden, complete cessation of smoking (3/6 resumed smoking, gradually and sporadically; 1/3 after 60 days, 2/3 after 14 days). Baseline ^{210}Po levels just before smoking was stopped were 0.77-1.07 μμC/kg in 2/6 and 1.58-1.72 μμC/kg in 4/6. These levels fell in 6/6, an av. of 4%/day in the first 3-4 days after smoking was stopped (to 78.5-93.5% of baseline levels); the decrease in ^{210}Po conc. thereafter was slower, reaching 76.5-85.5% of the baseline levels after 11-14 days. After 64-89 days, the ^{210}Po level in 2/6 was about 53% of the baseline value. It is concluded that a major fraction of the ^{210}Po inhaled in cigarette smoke is absorbed directly into the bloodstream.

69-929 MALIGNANT NEOPLASMS OF THE SKIN IN EASTERN INDIA. (AN ANALYSIS OF CASES SEEN AT THE CHITTARANSAN CANCER HOSPITAL, CALCUTTA, DURING THE YEARS 1963-1965 INCLUSIVE.) (E.)

Chakravorty, R. C. (Chittaranjan Cancer Hosp., Calcutta, India) and R. Dutta-Choudhuri. Indian J. Cancer 5(2):133-144, 1968.

Skin tumors (excluding tumors of the mucocutaneous junction) were seen in 113/6012 cancer pts. admitted in 1963-1965. The 72 pts. with squamous cell carcinoma included 34 with de novo cancer of the head and neck (14/34; 41%), trunk or scrotum (6) and extremities (14) and 38 pts. with "induced" tumors. Etiologic factors in the latter group included albinism in 3/38 (8%; the distribution of malignant and premalignant lesions suggested sun exposure and chronic irritation as contributing factors), burn scars (16/38; 12.4% of all skin tumors, 40% of all induced carcinomas), web carcinoma arising from chronic interdigital infections of the feet (7/38; 18%), local injuries leading to unhealed wounds or fractures (6/38), filarial elephantiasis of the scrotum (2/38), chronic irritation from the sari (2 women) and a kala-azar ulcer of the leg (1/38). Of the 19 basal cell carcinomas (12%), 17 involved the head and neck; of the 10 melanomas (8.85%), 2 involved the temporal areas and 8 involved the plantar regions of the feet. The incidence of dermatofibrosarcoma in this pt. group was high (6 pts.). Other skin tumors included adenocarcinoma of the sweat gland (2) or sebaceous gland (1), rhabdomyosarcoma (2) and Kaposi's sarcoma (1). The over-all incidence of skin tumors in this hospital population was very low (1.87%) and the ratio of basal cell to squamous cell carcinoma was relatively low (1:3.9), compared to reported data from the U.S. and Western Europe, but the incidence of induced skin tumors was high.

69-930 OSTEOSARCOMA IN AN IRRADIATED CHILD. PRESENTATION OF A CASE. (Fr.)

Laurent, Y. (Cesar De Paepe Clin., Brussels), J. Detroux, J. Lebrun and J. Rosillon. J. Belg. Radiol. 31(3):112-116, 1968.

A 6-mo.-old girl with a progressive congenital angioma of the left axilla was treated for 38 mo. with 9 applications of local radiotherapy (RT; total 4250 r; never over 975 r in more than 3 doses at any site), which caused complete regression of the angioma. About 12 yr. after the last RT dose (age 16 yr.) the pt. was admitted with pain and weakness of the left arm; a 2-wk. series of X-rays of the arm showed progressive osteolysis of the humerus, indicating malignant transformation. Biopsy revealed osteogenic sarcoma. The pt. failed to respond to ^{60}Co irradiation. It is pointed out that limiting the original RT dose to a small area of the axilla and arm proportionately increased the radiation dose to the upper humerus. It is concluded that RT should be avoided whenever possible in pts. (especially children) with benign lesions of the soft tissues or even the bones.

69-931 EXPERIMENTAL INDUCTION OF OSTEOSARCOMAS. (E.) Finkel, M. P. (Argonne Nat. Lab., Ill.) and B. O. Biskis. Progr. Exp. Tumor Res. 10:72-111, 1968.

Osteosarcoma induction was studied in female CF1 mice (age 5-6 wk.; in 1 experiment, responses in CF1 and CBA mice were compared) treated i.v. with bone-seeking radionuclides (^{226}Ra, ^{239}Pu, ^{232}U, ^{233}U, ^{90}Sr or ^{45}Ca); the effects of continuous treatment (ingested ^{90}Sr), fractionated doses (^{90}Sr or ^{45}Ca) and time-limited exposure (X-rays or ^{90}Y) were also studied. Tumor development was a function of the dose rate and the absorbed dose (1 or the other factor predominated under different conditions) and the microscopic distribution of the dose in time and space. X-irradiation induced osteosarcoma at low doses (500 rads). In another series of experiments, FBJ osteosarcoma virus (isolated from a tumor developing spontaneously in an untreated CF1 male mouse) induced osteosarcoma very rapidly in newborn mice; pretreatment with this virus enhanced the carcinogenic effect of inj. ^{90}Sr. Evidence for the presence of a similar sarcoma virus in human and canine (radiation-induced) osteosarcomas is discussed.

69-932 RADIATION-INDUCED EXPERIMENTAL CANCER OF THE ESOPHAGUS. (E.) Gates, O. and S. Warren (New Eng. Deaconess Hosp., Boston, Mass.). Amer. J. Path. 53(5):667-685, 1968.

Implantation of ^{60}Co wires into the lungs (up to 8 mm from the esophagus) of 4-10-wk.-old mice induced typical epidermoid carcinoma of the esophagus in 15% of 286 animals surviving 40 days or more. Most definite tumors appeared after 120-200 days of exposure, but cellular changes indistinguishable from cancer often developed after 1-4 wk. The tumor incidence was highest (46%) at 751-1000 r/day (the middle dose range), but the av. survival times and the risk of ever developing esophagus cancer increased with the dose. The tumor incidence was 14% in males and 16% in females, with a slightly longer av. survival time in females (with or without esophagus cancer) than in males. The tumor incidence at low radiation doses (100-250 r/day) was 15% in females and 3% in males, but this sex difference disappeared at the 751-1000 r/day level (45% in males, 48% in females). The treated mice were of strains RAP (random-bred Swiss), Ajax, C57Bl, CF$_1$, C3H, dba, LAF and BALB. The only significant strain difference in tumor incidence was seen between Ajax and BALB mice (5% and 38%, resp.). The only significant sex difference within a strain was seen in BALB mice, with a max. tumor incidence at higher doses in males than in females (1000-1500 and 750 r/day, resp.).

69-933 CANCERS INDUCED IN DIFFERENT SPECIES BY CONTINUOUS γ-RADIATION. (E.) Warren, S. (Cancer Res. Inst., Boston, Mass.) and O. Gates. Arch. Environ. Health (Chicago) 17(5):697-704, 1968.

Continuous irradiation by ^{60}Co wires implanted in the lungs induced tumors of the lung (bronchogenic carcinoma), esophagus (epidermoid carcinoma) and/or bone (osteogenic sarcoma) in about 33% of 363 young adult rodents of 5 species. The total incidence of these tumors was 75% in NEDH rats, 50% in dwarf Netherlands-Polish rabbits, 40% in SR guinea pigs and 30-32% in Syrian golden hamsters and mice (strains Ajax, RAP, CF$_1$, C57 Black, C3H, dba, LAF and BALB). Osteogenic sarcomas developed in rats (20%), rabbits (25%) and guinea pigs (15%), but not in mice or hamsters. The incidence of esophagus cancer varied according to strain (5-38%; over-all, 15%) in the mice; in the larger species it was 25-30%. The incidence of lung cancer was 75% in rats, 42% in rabbits, 25% in guinea pigs, 20% in mice and 8% in hamsters. The incidence of multiple tumors was 45% in rats, 33% in rabbits, 20% in guinea pigs and 4% in mice and hamsters. The incidence of lung cancer (all species) increased with the radiation dosage up to 1001-1500 r/day, then leveled off; the esophagus cancer incidence peaked at 751-1000 r/day, while the osteogenic sarcoma incidence decreased at the doses over 750 r/day.

69-934 HISTOGENESIS OF OVARIAN TUMORS. (Rus.) Gubareva, A. V. (Cent. Res. Roentgen-Radiol. Inst., Leningrad, U.S.S.R.). Vop. Onkol. 14(9):45-52, 1968.

Pappolov strain mice (18 g) were treated with 200 r of ^{60}Co in 1 dose or in 4 equal doses over 4 wk.; ovarian tumor development was observed in groups of mice sacrificed at 2-wk. intervals for up to 1 and 2 yr., resp. The functional and morphological multipotentiality of the ovary was evident. Granulosa cell tumors developed from both the theca tissue and from the rudimentary epithelium, thecomas from theca tissue, Sertoli cell tumors from rete cells and sometimes from the tubular and basal elements of the rudimentary epithelium. Secondary luteinized tumors composed of granulosa cells were more frequent than the "independent" luteomas developing from the intermediate tissue of the ovarian cortex. Cilioepithelial cysts developed in the portal region, in connection with the ovarian rete. Mixed tumors sometimes developed from fused elements of originally independent tumors, more frequently by tubulo-organoid proliferation of the ovarian capsule.

69-935 EARLY CHANGES IN RATS AFTER ADMINISTRATION OF THE MINIMUM CARCINOGENIC DOSE OF STRONTIUM-90. (Rus.) Berezovskii, B. S. (Kazan Vet. Inst., USSR). Radiobiologiia 8(4): 594-599, 1968.

Inbred white rats (200-250 g) admin. 1 dose of ^{90}Sr in the minimum carcinogenic dose (0.05 μC/g i.p.) showed no clinical symptoms of radiation toxicity in the next 210 days (the tumor latent period), but biological signs of radiation injury were apparent in the early stages after treatment. Adrenal wt. increased and thymus wt. fell after 2 wk. Adrenocortical function was increased after 6 wk.; the serum protein response to ACTH was exaggerated at 2-16 wk., but the eosinophil response to ACTH after 18-24 wk. showed reduced adrenal function, and after 26 wk. the treated rats showed lower adrenal function than untreated controls. At 6-14 wk. after treatment, total serum proteins and serum albumin fell by up to 8.5% and 18%, resp., with a corresponding increase in α- and β-globulins. Nonspecific immunity (neutrophil phagocytosis) was reduced by wk. 14. after ^{90}Sr admin.

69-936 THE RBE FOR SKIN TUMORS AND HAIR FOLLICLE DAMAGE IN THE RAT FOLLOWING IRRADIATION WITH ALPHA PARTICLES AND ELECTRONS. (E.) Burns, F. J. (New York U. Med. Ctr., N. Y.), R. E. Albert and R. D. Heimbach. Radiat. Res. 36(2):225-241, 1968.

The relative biological effectiveness (RBE) of irradiation on the skin was studied in male albino CD rats irradiated with cyclotron-accelerated α particles (210-6850 rads; 210 rats) or monoenergetic electrons (810-12,300 rads; 195 rats) when the hair follicles were in the telogen (resting) stage (age 58 days). The beams were modified to approx. identical depth-dose curves, with penetrations of about 1.0 mm. Up to 76 wk. after α or electron irradiation, 183 and 234 skin tumors developed, resp., predominantly of the keratinized (48.5% and 43.9%, resp.) or undifferentiated types (25.6% and 29.8%, resp.). For both radiation types, the tumor incidence increased approx. as the square of time and (at low doses) the fourth power of the dose. The correlation between the tumor incidence and the number of damaged hair follicles was the same with each type of radiation. Mean RBE values (determined from comparisons of the dose-response curves) were: hair follicle survival = 2.1; acute skin injury = 3.0; hair follicle damage = 2.6; tumor induction = 2.9, independent of the dosage. The results were consistent with the hypothesis that hair follicle damage is of importance in tumor induction.

See also abstract nos.: 912,917

69-937 FREE RADICAL PROPERTIES OF OXY DERIVATIVES OF 3-METHYLCHOLANTHRENE. (Rus.) T. Gurski (Oncol. Inst., Gliwice, Poland) and E. Kshivan'ska. Vop. Onkol. 14(10):111-112, 1968.

When 3-methylchlolanthrene (MC) was catalytically oxidized to quinones in the presence of V_2O_5, analysis of the products by infrared spectroscopy indicated a 2-step oxidation. The oxidation products in solid state were also investigated by electron paramagnetic resonance. The signals were more intensive for the secondary than for the primary oxidation product. The quinones were dissolved in acetone and mixed with equimolar amounts of diphenylpicrylhydrazine (DPPH), and the optical density at 520 mμ was determined. A marked decrease in the optical density was observed as a consequence of the reaction of free radicals with DPPH. It is concluded that catalytic oxidation of MC in the presence of V_2O_5 leads to the formation of stable free radicals.

69-938 RAPID FLUORIMETRIC METHODS BY INSTANT THIN-LAYER CHROMATOGRAPHY FOR THE ASSAY OF PHENALEN-1-ONE AND 7H-BENZ(de)ANTHRACEN-7-ONE IN POLLUTED URBAN ATMOSPHERES. (E.) Engel, C. R. (Nat. Air Pollution Admin., Cincinnati, Ohio) and E. Sawicki. J. Chromatogr. 37(3-4):508-517, 1968.

Methods using silica gel-impregnated glass-fiber paper are described; 1 for the specific determination of phenalen-1-one (PO) and another for the determination of PO and 7H-benz(de)anthracen-7-one at the same time. Both methods gave good accuracy and precision and were superior to others with respect to sensitivity, simplicity, selectivity and speed. In the absence of fluorescence instrumentation, the amounts of both compounds can be estimated by eye under UV light after separation. Results obtained by this method using benzene-soluble fractions of air-borne particulate matter from 11 American cities are presented.

9-939 IMMUNOELECTROPHORETIC ANALYSIS OF LABELING OF SERUM PROTEINS AFTER ADMINISTRATION OF THE CARCINOGEN N-HYDROXY-N-2-FLUORENYLACETAMIDE. (E.) Deckers, C. (Cancer nst., Louvain, Belgium), P. H. Grantham and J. H. Weisburger. Cancer Res. 28(10):1990-1992, 968.

A highly specific immunoelectrophoretic method, using anti-rat rabbit serum, demonstrated that serum proteins originating in the liver (especially albumin) and 2 distinct α_1 globu-ins were the main carriers of radioactivity from ^{14}C-labeled N-hydroxy-N-2-fluorenylacetamide (10 mg/kg x 1 i.p. or i.v.) admin. 1-96 hr. previously in male Fischer rats. Relatively small amounts of radioactivity were also associated with transferrin and the IgG arc.

69-940 EXPERIMENTAL STUDIES ON THE FORMATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN PLANTS. (E.) Borneff, J. (U. Mainz, Germany), F. Selenka, H. Kunte and A. Maximos. Environ. Res. 2(1):22-29, 1968.

The formation of polycyclic aromatic hydrocarbons (PAH) was studied in Chlorella vulgaris grown in neutral media containing acetate as the sole carbon source. In algae grown in unlabeled acetate, the specific activity of all isolated PAH except fluoranthene was within a 2-fold limit of the background level. In algae grown in ^{14}C-labeled acetate, the radioactivity of benzo(k)-fluoranthene increased 7.2-fold (by comparison with levels in algae grown in unlabeled acetate) and radioactivity of 6 other PAH (3,4-benzpyrene, benzo(b)-fluoranthene, indeno(1,2,3-cd) pyrene, benz(a)anthracene, fluoranthene and benzo(ghi)perylene, in increasing order) 10.7-16.4 fold. The results suggested that PAH in vegetables and their products, ground water and soil may reflect biosynthesis of PAH by plants and their utilization as plant growth substances.

69-941 CARCINOGENICITY OF LACTONES. III. THE REACTIONS OF UNSATURATED γ-LACTONES WITH L-CYSTEINE. (E.) Jones, J. B. (U. Toronto, Canada) and J. M. Young. J. Med. Chem. 11(6): 1176-1182, 1968.

No correlation was seen between the biological (including carcinogenic) effects of a series of unsaturated γ-lactones and their reactions with L-cysteine. However, another chemical basis was found to predict carcinogenic activity: the carcinogenic lactones underwent Michael addition of the nucleophilic thiol group to the conjugated unsaturation(s), yielding S-alkylated adducts which proved biologically irreversible under any known normal conditions. The inactive lactones (containing double bonds not conjugated with the carbonyl group) were also rapidly attacked by the cysteine thiol group, but this was accompanied by addition at the lactone carbonyl group, yielding S-acylated intermediates which were rapidly rearranged to N-acylated cysteines in neutral soln. Cell damage from this acylation process could readily be repaired by proteolytic enzymes.

69-942 MICRO-INVASION OF EPIDERMIS CAUSED BY SUBSTITUTED ANISOLES. (E.) Riley, P. A. (U. Coll. Hosp. Med. Sch., London) and P. Seal. Nature (London) 220(5170):922-923, 1968.

The effects of 3- and 4-hydroxyanisole, 7C-phenyl-4-hydroxyanisole and 2 butylated hydroxyanisoles

(BHA; 2- or 3-tert.-butyl-4-hydroxyanisole) after up to 6 wk. of application to the ears (1 dose/day; in 20% lanolin suspensions) were studied in inbred black guinea pigs. Microinvasion of the epithelium by basal cell pseudopods was seen after 2 wk. or more, associated with destruction of the superficial connective tissue and fragmentation of collagen. The 7C-phenyl compound and the BHA derivatives (noteworthy for their widespread use as antioxidants in foods) were particularly active.

69-943 EFFECT OF 4-NITROQUINOLINE-1-OXIDE ON THE EARLY STAGE OF THE DEVELOPMENT OF SEA URCHIN EGGS. (E.) Kamahora, J. (Osaka U., Japan) and T. Kakunaga. Biken J. 11(2):139-144, 1968.

Noticeable retardation in the early stages of development of sea urchin eggs was seen with 4-nitroquinoline-1-oxide (NQO; as low as 10^{-6} M) but the same conc. of 4-nitroquinoline (NQ) was ineffective. The inhibitory action of non-carcinogenic NQ was about 10% of the inhibitory action of NQO. Minimum conc. causing complete inhibition when admin. 10 min. after fertilization were 3×10^{-6} M and 10^{-4} M for NQO and NQ, resp. Effects were similar if NQO and NQ were added just before fertilization, but inhibition was less when NQ and NQO were added at the stage of the first streak. When sperm were treated with NQO (up to 10^{-3} M for 3 hr. before fertilization), no noticeable changes in the process of fertilization were seen, but the same treatment of unfertilized eggs caused retardation or inhibition of development (depending on the conc. of NQO), although the fertilization membrane was elevated normally. Acetone (a solvent of NQ) had no visible effect on the development of eggs or the retarding effect of NQO.

69-944 BIOLOGICAL AND METABOLIC EFFECTS OF NITROSOMETHYLUREA AND NITROSOMETHYLURETHAN. (E.) Rosenkranz, H. S. (Columbia U., New York, N. Y.), M. Bitoon and R. M. Schmidt. J. Nat. Cancer Inst. 41(5):1099-1109, 1968.

The lethal effects of nitrosomethylurea and nitrosomethylurethan (both at 10^{-3} M and over) in Escherichia coli C600 were accompanied by inhibition of DNA synthesis and degradation of cellular DNA. These lethal actions were prevented by sodium azide, but not by specific inhibitors of DNA (hydroxyurea), RNA (azauracil) or protein synthesis (chloramphenicol). The mechanisms of action of nitrosomethylurea and nitrosomethylurethan were similar; a bacterial mutant resistant to 1 compound was cross-resistant to the other. However, the mechanism of action of these compounds is not the same as that of other monofunctional alkylating agents, such as methyl methanesulfonate.

69-945 EFFECT OF 7,12-DIMETHYLBENZ(α)ANTHRACENE ON THE MITOTIC CYCLE OF RAT EMBRYONIC FIBROBLAST-LIKE CELLS AND CELLS OF TRANSPLANTABLE RAT SARCOMA 45 IN VITRO. (Rus.) Iaskovets, A. A. (Inst. Exp. Clin. Oncol., Moscow). Vop. Onkol. 14(9):58-64, 1968.

In primary explant (coverslip cultures) of rat embryo fibroblast-like cells exposed for 4 days to 7,12-dimethylbenzanthracene (DMBA; 2.5×10^{-6} -2.5×10^{-4} mg/ml), DNA synthesis (determined by ^{3}H-thymidine incorporation on day 5) was markedly inhibited at all DMBA conc. The S, G_1 and G_2 phases of the mitotic cycle were also prolonged by DMBA. In coverslip cultures of rat Sarcoma 45 cells, DMBA had no effect on the mitotic cycle.

69-946 7,12-DIMETHYLBENZ(a)ANTHRACENE-INDUCED ADRENOCORTICAL NECROSIS AND ITS INHIBITION BY METOPIRONE (SU4885). (E.) Jull, J. W. (U. British Columbia, Vancouver, Canada). Cancer Res. 28(10):2162-2163, 1968.

In male rats (inbred hooded strain; 165-190 g), treatment with Metopirone ditartrate (M; 40 mg s.c.) inhibited the adrenocortical necrosis induced by admin. of 7,12-dimethylbenzanthracene (DMBA; 5 mg i.v. in oil emulsion) 30 min. before or after M, but no inhibition was seen when DMBA and M were admin. at intervals of 1 hr. or more. Adrenocortical necrosis was induced by 2 divided doses of DMBA (each 2.5 mg in oil emulsion) if admin. simultaneously or at intervals of 30 min. or less, but not when the interval between DMBA doses was 1 hr. or more.

69-947 CARCINOGENIC EFFECTS OF OVERHEATED FATS. (Rus.) Vysheslavova, M. Ia. (Nutr. Inst., Acad. Med. Sci. USSR, Moscow). Vop. Pitan. 27(3):63-68, 1968.

The carcinogenic effects of heated and unheated sunflower oil (SO; 10% by wt. in diet, fed throughout life) were studied in 2 groups of male rats (80 g). No tumors developed in the 2 control groups (78 rats) fed unheated SO. In a 40-mo. experiment in 70 rats fed heated SO (180-200° C for 5-6 hr.; oxidation rate 1.0-1.5%), 6/32 rats surviving at the time the first tumor appeared (induction times were 724-1005 days) eventually developed malignant tumors (4 s.c. polymorphocellular sarcomas, 1 pulmonary angiosarcoma, 1 pulmonary round cell sarcoma); av. survival times in treated and control rats were 8 and 16 mo., resp., but no significant differences in body wt. were noted. In a 44-mo. experiment in 97 rats fed heated SO (190° C for 14-35 hr.; oxidation rate 2.0-3.5%), benign tumors eventually developed in 2/75 rats (13.3%) surviving when the first benign tumor appeared (14 mo.) and malignant tumors developed in 8/50 rats (16%) surviving when the first malignant tumor appeared (induction times were

467-1237 days). These tumors included 3 polymorphocellular sarcomas (1 s.c., 1 of the large intestine, 1 widespread), 1 cavernous angioma (s.c.), 1 spindle cell sarcoma (s.c.), 1 round cell sarcoma (mesenteric lymph nodes), 1 myosarcoma (paw and abdomen), 1 leiomyoma (stomach), 1 basal cell carcinoma (paw) and 1 keratotic carcinoma (skin); 3 rats developed metastases. Other pathological findings in this group included lung abscesses (most rats), gastric ulcers (3), colloidal goiter and pleural empyema (1 each); body wt. was below control levels during the first 1 yr. of treatment. Both groups of rats admin. heated SO also showed brown skin pigmentation and many rats developed diarrhea and edema. The total tumor incidence in both groups was 16/107 (15%) in rats surviving until the first tumors appeared.

69-948 CARCINOGENIC POTENCY OF URETHAN IN THE SPRAGUE RAT. (Fr.) Adenis, L. (Cancer Res. Inst., Lille, France), A. Demaille and J. Driessens. C. R. Soc. Biol. (Paris) 162(2):458-461, 1968.

In 50 female Sprague rats (Gif-sur-Yvette strain) treated with urethan (0.1% in drinking water) from age 4-5 mo. throughout life, the av. survival time was 12.5 mo. (range, 8-19 mo.) after the beginning of treatment. A total of 49 tumors developed in 33/40 (82%) of the evaluable rats: 11 hemangiomas and hemangiosarcomas (liver, spleen, uterus), 10 adrenocortical adenomas, 7 hepatomas, 7 lymphosarcomas, 4 fibrosarcomas (mesentery or uterus), 6 fibroadenomas and 1 carcinoma of the mammary glands, 1 kidney carcinoma and 1 thyroid carcinoma. Three rats had 3 tumors and 9/33 had 2 tumors each.

69-949 CARCINOLYSIS IN THE DEVELOPMENT OF EXPERIMENTAL TUMORS. (Rus.) Poliak, N. R. (Res. Inst. Exp. Clin Oncol., Kiev, USSR). Vop. Onkl. 14(10):49-52, 1968.

The oncolytic properties of sera of rats with Guérin carcinoma were determined at various intervals after s.c. transplantation of this tumor. The oncolytic coefficient (QL; ratio of Ehrlich ascites carcinoma cells lysed in the presence of the serum to those lysed in its absence) was used as a measure of the lytic activity. The QL of the sera dropped 2 days after tumor inoc., from 1.1-1.5 to 0.2, and remained low during the next 26 days. The tumors became palpable on day 6; thus, the decrease in lytic activity of the serum preceded tumor formation. In rats admin. 7,12-dimethylbenzanthracene (DMBA; 8 mg i.v. in 4 equal doses at 1-wk. intervals) the serum lost its lytic activity 4 hr. after the first inj. of DMBA (decrease of QL from 1.25 to 0.4). Sera of some treated animals even induced multiplication of Ehrlich ascites carcinoma cells. At 4 hr. after the last inj. the serum QL was still low, but it had increased somewhat 4 days later. After another 4 wk. the av. QL decreased markedly again to 0.34 and remained low during the rest of the observation period. About 7 wk. after the last inj. of DMBA the tumors were palpable. Similar results were obtained when tumors were induced in rats by irradiation with fast neutrons (50 rad). The tumors appeared 15-18 wk. after irradiation, but serum lytic activity decreased markedly after 3 mo. (QL = 0.1) and remained low during the next 12 mo.

69-950 EVALUATION OF 3:2'-DIMETHYL-4-AMINOBIPHENYL HYDROCHLORIDE AS A CARCINOGENIC AGENT IN RATS. (E.) Higgins, T. P. (St. Vincent's Hosp Med. Ctr., New York, N. Y.), C. E. Grossi, A. J. Conte and L. M. Rousselot. Dis. Colon Rectum. 11(5):365-366, 1968.

No lesions of any type were seen in the 100/120 surviving Wistar rats treated with 3:2'-dimethyl-4-aminobiphenyl HCl (DABP HCl; 2 mg/100 g/day x 5 in peanut oil; by inj.), until the development of areas of lymphoid hyperplasia (mostly in the rectum) after 32 wk. of observation. Somewhat smaller lesions of the same type were seen at the same time in peanut oil-treated controls. Adenomas of the intestine developed after 44 wk. of observation in 4/30 rats admin. DABP HCl (total, 498 mg) and in 3/40 controls. No carcinomas were seen. No tumors developed at any other site. It is concluded that DABP HCl is unsuitable as a carcinogen, but further studies of the carcinogenic free amine (DABP) are recommended.

69-951 TREATMENT OF ARTIFICAL METASTASES OF METHYLCHOLANTHRENE-INDUCED RAT SARCOMAS BY AUTOIMMUNIZATION OF THE AUTOCHTHONOUS HOSTS. (E.) Takeda, K. (Hokkaido U. Sch. Med., Sappora, Japan), Y. Kikuchi, S. Yamawaki, T. Ueda and T. Yoshiki. Cancer Res. 28(10):2149-2154, 1968.

Transplantation immunity against autochthonous 3-methylcholanthrene (5-10 mg pellets implanted s.c.)-induced sarcomas, induced by ligation and release of the primary tumors in inbred adult Wistar/Mk or Fisher (line 344) rats (both sexes), varied from 1 animal to another. Autotransplanted (s.c.) artificial metastases of these tumors were suppressed or rejected by intensive immunization against the primary autochthonous tumors, the degree of immunization being related to the antigenicity of the primary tumors (classified as high, moderate and low by the HML classification of Takeda). The best demonstrations with the highly antigenic tumors in the primary autochthonous hosts, in isoimmune hosts, and particularly in rats undergoing immunization of the artificial metastases of suppression soon were obtained after implantation of the metastases.

69-952 EXPERIMENTAL CERVICAL DYSPLASIA IN THE RHESUS MONKEY. ESTROGEN AS A COFACTOR WITH METHYLCHOLANTHRENE. (E.) Kaminetzky, H. A. (U. Illinois Coll. Med., Chicago) and M. Swerdlow. Amer. J. Obstet. Gynec. 102(3):404-414, 1968.

Methylcholanthrene was applied to the uterine cervix of 16 mature female rhesus monkeys (3 doses/wk. of 1% mineral oil suspension x 4 mo.); 8 animals were allowed to menstruate physiologically and 8 received estradiol benzoate (3 doses/wk of 20 µg i.m. in sesame oil). In estrogen-treated animals the squamous epithelium of the cervix was hyperplastic and epithelial pegs were found deeper in the stroma (as compared to menstruating animals). However, cellular maturation was normal and epithelial cells were clearly separated from the stroma in the thickest areas. Only mild cellular atypia was seen in the 8 menstruating animals, but 4/8 estrogen-treated animals showed advanced epithelial dysplasia (most advanced atypia was seen in areas where the epithelium was relatively thin).

69-953 CARCINOGENESIS OF THE UTERINE CERVIX IN MICE: EFFECT OF CASTRATION AFTER LIMITED APPLICATION OF 3-METHYLCHOLANTHRENE. (E.) Murphy, E. D. (Jackson Lab., Bar Harbor, Me.). J. Nat. Cancer Inst. 41(5):1111-1116, 1968.

Virgin Strain A/J mice (7 wk. old) were implanted with methylcholanthrene (MCA)-coated threads in the cervical canal; 8 or 12 wk. later the threads were removed and some mice of each group underwent oophorectomy (oox.). In mice implanted with threads containing 0.04 mg of MCA, the lifespan incidence of squamous cell carcinoma of the cervix was 26.7%; oox. reduced this incidence to 2.0%. At MCA doses of 0.4 mg, the tumor incidence in mice exposed for 8 and 12 wk. was 85.7% and 100%, resp.; oox. reduced the tumor incidence to 28.3% and 62.3%, resp. The av. tumor latent periods and survival times were longer in oox. mice than in intact animals.

69-954 INDUCTION OF LEUKEMIA AND OVARIAN TUMORS IN MICE BY PULSE-DOSES OF POLYCYCLIC AROMATIC HYDROCARBONS. (E.) Uematsu, K. (U. Chicago, Ill.) and C. Huggins. Molec. Pharmacol. 4(5):427-434, 1968.

The toxic and tumor-inducing effects of single or multiple i.v. pulse doses of 7,12-dimethylbenzanthracene (DMBA), 7,8,12-trimethylbenzanthracene (TMBA), 3-methylcholanthrene (MC) and benzpyrene (BP) were studied in virgin female CF-1 mice and Sprague-Dawley rats. Both DMBA and TMBA caused selective damage of endocrine organs and hormone target organs, and depressed DNA synthesis in the spleen and ileum. In mice, DMBA and TMBA induced ovarian tumors and leukemia and caused severe ovarian injury, but did not affect the adrenals; MC and BP induced leukemia but did not induce ovarian tumors. Pulse doses of TMBA caused adrenal apoplexy but did not induce ovarian tumors in rats.

69-955 TRANSPLANTABLE LEYDIG CELL TUMORS IN FISCHER RATS: HORMONE RESPONSIVITY AND HORMONE PRODUCTION. (E.) Jacobs, B. B. (Amer. Med. Ctr., Denver, Colo.) and R. A. Huseby. J. Nat. Cancer Inst. 41(5):1141-1153, 1968.

Of 20 interstitial (Leydig) cell testicular tumors developing spontaneously in 17 aged male inbred Fischer rats, 2 were not transplantable, 10 were discarded after the hosts developed leukemia and 8 were successfully transplanted for 4-12 passages (at the time of report) in intact, oophorectomized, orchiectomized and/or hypophysectomized Fischer rats. These 8 tumors arose in 7 rats (1 had 2 tumors of differing histology and function); other tumors seen in 5/7 original hosts included 1 mammary fibroadenoma, 3 thyroid tumors (in 2 rats) and 3 adrenal medullary pheochromocytomas. These tumors showed a wide variety of functional and morphological properties. One tumor showed only androgenic (A) activity, 2 showed estrogenic (E) activity and 6/8 showed various degrees of both A and E activity; 3/8 were responsive to pituitary hormones (PH), 4/8 were PH-dependent and the PH response of 1 was not studied. Hormone production, hormone responsiveness and tumor morphology were apparently independent of each other. These spontaneous Leydig cell tumors resembled estrogen-induced Leydig cell tumors in mice.

69-956 UROGENITAL NEOPLASMS AND ENZYMES. VI. LACTIC DEHYDROGENASE (LDH) AND ALKALINE PHOSPHATASE ACTIVITIES AND LDH ISOZYMES OF THE TESTES AND SERA OF THE MICE WITH TESTICULAR TUMORS EXPERIMENTALLY INDUCED BY CADMIUM CHLORIDE. (Jap.) Ishibe, T. (Hiroshima U. Sch. Med., Japan). Hinyokika Kiyo (Acta Urol. Jap.) 14(7): 367-372, 1968.

Enzyme metabolism was studied in male dd-n mice (about 10 g) up to 8 mo. after treatment with cadmium chloride ($CdCl_2$; 0.03 Mmoles/kg x 1 i.p.), alone or + estradiol benzoate (EB) or testosterone propionate (TP). Alkaline phosphatase activity was markedly decreased after $CdCl_2$ admin. No significant changes in serum lactic dehydrogenase (LDH) were noted. Testicular LDH decreased markedly after admin. of $CdCl_2$, with an increase in LDH isoenzyme type M and a decrease in isoenzyme type H. The reduction of total LDH and the increase in the M isoenzyme were accentuated by EB. In TP-treated mice, testicular LDH showed a transient decrease, followed by an increase to levels above control values; the only LDH isoenzyme pattern change was a decrease in type H.

69-957 STUDIES OF THE INTERSTITIAL CELLS OF THE RENAL CORTEX. CONTRIBUTION TO THE PROBLEM OF THE ORIGIN OF MESENCHYMAL TUMORS OF THE KIDNEY IN RATS. (Ger.) Buss, H. (U. Hamburg, Germany) and W. Gusek. Virchows Arch. Abt. B Zellpath. 1(3):251-268, 1968.

The development of the interstitial cells of the renal cortex was studied in untreated Wistar strain BR 46 rats from 1-32 days after birth. The interstitial cells developed from round, undifferentiated cells into fibroblast-like spindle-shaped cells or into large vacuole-containing cells during the first 13 days of life. At age 20-32 days, the predominant cells were of the type that later persisted adjacent to the renal tubules. The function of the interstitial cells was to produce and maintain the tubular basal membrane. The development of these cells in relationship to the behavior of cycasin-induced interstitial cell tumors is discussed.

69-958 CLINICAL STUDY OF THE CARCINOGENIC EFFECTS OF ISONIAZID AND ITS DERIVATIVES. (It.) Cocchi, R. (U. Florence, Italy) and C. Cocchi Belisario. Riv. Clin. Pediat. 80(5):466-469, 1968.

Isoniazid was admin. in high doses (10-30 mg/kg/day for up to 8 wk.) to 220 children with tubercular meningitis, seen from 1953-1963. At the time of report, none had developed any signs of malignant disease.

69-959 SANGUINARINE--A CARCINOGENIC CONTAMINANT IN INDIAN EDIBLE OILS. (E.) Hakim, S. A. E. (Sola Hakim Med. Res. Ctr., Bombay, India). Indian J. Cancer 5(2):183-197, 1968.

Several epidemics of edema, glaucoma, heart disease, abortions and diarrhea (sometimes fatal) in India were traced to adulteration of cooking oils by oil from the seeds of Argemone mexicana (argemone weed; yellow-flowered prickly poppy). Since the toxic alkaloid of this plant, sanguinarine (S), was also found in 49 species of 14 genera of the poppy-fumaria family, it was suggested that transmission of S by foods (especially milk from animals grazing on plants of this group which have worldwide distribution) might explain the worldwide occurrence of glaucoma. At least 4 fluorescent metabolites were isolated from the tissues of S-treated rats, 1 of which was benz(c)acridine (BcA); several experiments demonstrated that both S and BcA were complete carcinogens, inducing skin tumors in mice and bladder tumors in rats. A survey of the literature (85 references) led to the suggestion that S is carcinogenic in man. For example, western India and Assam (where argemone weed grows wild and is used in cooking oils) and the West Indies (the original home of the plant) have the world's highest incidence of cancer of the esophagus; transmission of S by milk from animals grazing on plants of the poppy-fumaria family might also account for the high incidence of this tumor elsewhere (e.g., Bedouins of the Arab Peninsula and rural Scandinavia). It is also suggested that smoking of opium (which also contains S) might explain the high incidence of nasopharyngeal cancer in Chinese men in Singapore and in male Chinese and Filipinos in Hawaii.

69-960 NITROSAMINES IN AFRICAN ALCOHOLIC SPIRITS AND OESOPHAGEAL CANCER. (E.) McGlashan, N. D. (U. Zambia, Lusaka), C. L. Walters and A. E. M. McLean. Lancet 2(7576):1017, 1968.

Polarographic and chromatographic analysis of 8 samples of "Kachasu" from Zambia (locally distilled from a corn husk-sugar fermentation liquor with added herbs, using any kind of tubing for the distillation and condenser apparatus, including old automobile exhaust pipes) showed 1-3 ppm of dimethylnitrosamine (DMN) or a similar nitrosamine (NA) compound in 8/8 samples. No NA compounds were detected in a commercially distilled sample of British gin. No polycyclic hydrocarbons were seen in the Kachasu samples (the limit of detection was 0.01 ppm). Since Kachasu consumption is associated with a high incidence of esophageal cancer, and since DMN is more often associated with liver and kidney cancer in most species tested, it is suggested that the esophageal carcinogen present in Kachasu is not DMN but another compound of the same series.

69-961 PRE-CANCEROUS CHANGES IN BLADDER EPITHELIUM. (E.) Schade, R. O. K. (Newcastle Gen. Hosp., England) and J. Swinney. Lancet 2(7575):943-946, 1968.

Biopsy specimens of the apparently normal bladder mucosa distant from the primary tumor (transitional cell carcinoma) showed normal histology in only 5/100 pts. Chronic inflammation was seen in 1/100, squamous metaplasia in 2/100, glandular cystitis in 20/100 (with carcinoma in situ in 10/20 and atypical epithelium in 4/20), atypical epithelium in 42/100 and carcinoma in situ in 30/100. This high frequency of premalignant changes of the apparently normal bladder epithelium suggested an explanation for the occurrence of tumor cells in the urine of persons without grossly visible bladder tumors (as in workers in the chemical industry during periodic checkups). It is also suggested that these changes may represent the action of carcinogens on the bladder mucosa.

69-962 PERITONEAL MESOTHELIOMA PRESENTING SURGICALLY. (E.) Smith, P. G. (London Hosp.), P. McR. Higgins and W. D. Park. Brit. J. Surg. 55(9):681-684, 1968.

Two brothers, employed in the asbestos industry for 35-36 yr., developed peritoneal mesotheliomas within 7 mo. of each other. Autopsy showed numerous asbestos bodies in the lungs in both cases. One pt. had been classified as 10% disabled from asbestosis 2 yr. before the diagnosis of mesothelioma. Clinical and pathological data on 10 other pts. with peritoneal mesothelioma are tabulated. Occupational exposure to asbestos was confirmed in 4/10 (1 yr. in a woman, 22-35 yr. in 3 men); 1 woman had lived within 1 mile of an asbestos factory and the husband of another woman worked in an asbestos factory. Histories of asbestos exposure in the other 4/10 are not specified, but autopsy examination of the lungs of 9/10 disclosed asbestos bodies in 6/9 and pleural plaques in 8/9.

69-963 III. COMMUNITY EFFECTS OF NONOCCUPATIONAL ENVIRONMENTAL ASBESTOS EXPOSURE. (E.) Selikoff, I. J. (City U. New York, N. Y.) and E. C. Hammond. Amer. J. Public Health 58(9):1658-1666, 1968.

A preliminary report of unselected autopsy cases (New York City) suggested that unrecognized occupational sources may add to and override general community exposure to asbestos: asbestos bodies were seen in the lungs of 179/355 (50%), including 14/47 housewives (30%), 45/111 male white-collar workers (41%) and 120/197 male blue-collar workers (60%). In 150/1117 asbestos insulation workers showing pleural calcification at X-ray examination, the incidence was 0/346 after 0-9 yr. of exposure, 5/379 (1.1%) after 10-19 yr., 8/77 (10.4%) after 20-29 yr., 67/194 (34.5%) after 30-39 yr. and 70/121 (57.9%) after 40 yr. and over. A 52-mo. follow-up of 370 asbestos workers exposed for at least 20 yr. showed a nearly doubled mortality rate (94 observed/47.5 expected). The observed/expected (O/E) death rates included: cancer, all sites = 49/8.6; stomach cancer = 3/0.6; colon and rectum cancer = 5/1.2; bronchogenic carcinoma = 24/about 2.3; other cancer = 7/4.5. Mesothelioma was seen in 10/49 with cancer. In this group of asbestos workers, the O/E death rate from bronchogenic carcinoma was 24/2.98 (an 8-fold increase) in 283 regular cigarette smokers, compared to 0/0.05 in 48 nonsmokers and 0/0.13 in 39 pipe and cigar smokers. Of 113 asbestos workers dying of bronchogenic carcinoma, mesothelioma or asbestosis, 58/69, 17/17 and 26/27, resp., had been occupationally exposed to asbestos for 30 yr. or more (over 50 yr. in 9 pts.); only 3/113 were under 50 and 49/113 were over 65 at the time of death.

69-964 THE EFFECT OF 3-METHYLCHOLANTHRENE ON RAT TRACHEA IN ORGAN CULTURE. (E.) Palekar, L. (New York U. Sch. Med., N. Y.), M. Kuschner and S. Laskin. Cancer Res. 28(10): 2098-2104, 1968.

Early signs of epithelial degeneration in tracheal rings from female Wistar rats (specific pathogen-free CFN strain) in organ culture (free-floating in liquid medium) were followed by rapid regeneration. Within 2 wk. an apparently normal ciliated epithelium developed. Fibroblasts did not overproliferate, mural connective tissue remained viable, and low-grade proliferation of chondrocytes was seen under the perichondrium at the tips of the cartilaginous rings. In cultures treated with the weak carcinogen 1,2-benzanthracene (2.3 μg/100 ml), the epithelium regenerated into a 2-cell layer, then growth and differentiation stopped. In cultures treated with 3-methylcholanthrene (2.3 μg/100 ml), squamous epithelial metaplasia and nodular basal cell proliferation developed, but no invasion through the basement membrane was seen after up to 6 wk. These changes resembled those preceding the development of invasive carcinoma in vivo.

69-965 EFFECTS OF ALUMINIUM COMPOUND ON THE DEVELOPMENT OF EXPERIMENTAL LUNG TUMOR IN MICE. (E.) Kobayashi, N. (Chiba U., Japan), G. Ide, H. Katsuki and Y. Yamane. Gann 59(5): 433-436, 1968.

The effects of inhalation of aluminum compounds (500 mg of Al_2O_3 crystals or 3 ml of 0.2% $AlCl_3$. $6H_2O$ soln.; 50 min./day; 6 doses/wk. x 1 wk. of 2 doses/wk. x 6 mo.) on lung carcinogenesis by 4-nitroquinoline-1-oxide (NQO; 0.5 mg x 1 s.c.) were studied in female ddN mice (20 g). The tumor incidence was studied after 60-186 days. Epidermoid tumors developed in 1/19 (5.3%) treated with $AlCl_3$ soln. alone (1-wk. and 6-mo. courses) and 1/19 admin. Al_2O_3 (1-wk. course) + NQO; in both cases, squamous cell metaplasia of the bronchial epithelium was also noted. Adenomas of the lung were seen in 4/17 (23.5%) admin. NQO alone, 1/19 admin. NQO + Al_2O_3 (1-wk. course), 2/17 (11.8%) admin. both aluminum preparations (Al_2O_3 for 1 wk., $AlCl_3$ for 6 mo. + 1 wk.) and 2/18 (11.1%) admin. NQO + $AlCl_3$ (6-mo. course). Atypical heterotopic growth of the lung tissue was seen in 9/17 (52.9%), 3/19, (15.8%), 1/17 (5.9%) and 5/18 (17.2%), resp., and in 3/19 (15.8%) admin. $AlCl_3$ alone (1-wk. and 6-mo. courses). The incidence of granulomas was highest in mice admin. the longer courses of aluminum (with or without NQO).

69-966 AN ELECTRON SPIN RESONANCE STUDY OF TOBACCO SMOKE CONDENSATES AND THEIR EFFECTS UPON BLOOD CONSTITUENTS. (E.) Rowlands, J. R. (Southwest Res. Inst., San Antonio, Tex.), R. M. Estefan, E. M. Gause and D. A. Montalvo. Environ. Res. 2(1):47-71, 1968.

Mechanisms of action of tobacco smoke condensates (TSC) were studied in several experiments, using female rabbit lung preparations or blood from adult male rats (Sprague-Dawley) or mice (Swiss).

The electron donor properties and free radical (FR) conc. of TSC and the products formed by interaction of TSC with lung phospholipids and hemoglobin (Hb) were studied by electron spin resonance spectroscopy. The results showed that TSC constituents entered the (a) bloodstream through the lung membranes, followed by a destructive interaction with Hb that (a) destroys its oxygen transport capacity by forming high-spin ferri-hemoglobin and low-spin ferrohemoglobin, and (b) removes iron from the porphyrin ring with the formation of 2 types of non-heme iron complexes. Non-FR constituents of TSC (probably nitrogen oxides) interacted with Hb and phospholipids to produce stable FR species, and in addition altered the environment and oxidation state of heme iron.

69-967 EFFECT OF CIGARETTE SMOKING ON PAROTID SECRETION. (E.) Barylko-Pikielna, N. (U. California, Davis), R. M. Pangborn and I. L. Shannon. Arch. Environ. Health (Chicago) 17(5): 731-738, 1968.

Several experiments in smokers and nonsmokers demonstrated significant increases (1.5-2.85-fold above resting levels) in parotid salivary flow after smoking of filtered cigarettes. Parotid secretion was also increased after drawing through unlighted cigarettes or after blocking the nose, but no consistent differences in salivary flow were seen after simple tactile, olfactory and visual stimuli related to smoking. In subjects wearing opaque goggles blocking all vision, both basal and smoking levels of parotid flow were significantly reduced, suggesting that factors affecting mental concentration or attention interfered with the autonomic control of salivary secretion.

69-968 EFFECT OF CIGARETTE SMOKING ON URINARY AND SALIVARY THIOCYANATES. (E.) Barylko-Pikielna, N. (U. California, Davis) and R. M. Pangborn. Arch. Environ. Health (Chicago) 17(5):739-745, 1968.

In 10 male smokers on an 11-wk. regimen of smoking (commercial unfiltered cigarettes) at habitual, reduced or above-normal levels, urinary thiocyanate (SCN) levels were roughly proportional to smoking patterns, but marked day-to-day and individual variations were seen. Urinary SCN levels in these subjects and 7 male nonsmokers were 12.9-31.1 and 14.0-19.4 mg/liter, resp. The large variations in urinary SCN levels were partially explained by the very rapid increase in salivary SCN levels during and just after smoking 1 cigarette. Salivary SCN levels were better correlated to the smoking regimen than urinary SCN. Neither urinary nor salivary SCN levels served as a precise index of individual exposure to smoking, but salivary SCN levels could be used to separate large populations of smokers and nonsmokers.

69-969 RETENTION OF CIGARETTE SMOKE COMPONENTS IN HUMAN LUNGS. (E.) Dalhamn, T. (Karolinska Inst., Stockholm), M.-L. Edfors and R. Rylander. Arch. Environ. Health (Chicago) 17(5):746-748, 1968.

Pulmonary retention of a standardized puff of smoke from unfiltered cigarettes (yielding about 30 mg tar/cigarette) after deep inhalation was studied in adult male and female smokers. Subtraction of components of the exhaled smoke from the components of smoke directly from the cigarette showed 54% retention of carbon monoxide (5 subjects), 86-96% retention of acetone, acetonitrile, toluene and particulate matter, and 99% retention of acetaldehyde and isoprene. In contrast to data for mouth absorption of the smoke constituents (previously reported), there was no apparent correlation between the pulmonary retention of the constituents and their water solubility.

69-970 CONTRIBUTION TO THE PROBLEM OF CHANGES IN THE BRONCHIAL MUCOSA IN TOBACCO SMOKERS. (Pol.) Ornowski, S. (Anti-Tuberc. San., Glucholazy, Poland). Przegl. Lek. 24(7): 593-595, 1968.

Bronchoscopic findings in 74 cigarette smokers (66 men, 8 women; av. age 34 yr.) showed little correlation with the X-ray findings, which showed no changes or only minimal inactive changes in the lungs. Bronchoscopy showed no changes in the bronchial tree in 12/74; 21 pts. with apparently normal bronchial mucosa showed large amounts of secretion in the lumen; 17 showed limited hyperemia and edema of the mucosa around the orifice of segmented bronchi; 13 showed hyperemia and thickening of the mucosa in the whole bronchial tree, with narrowing of the orifice of the segmental bronchi and mucopurulent secretion; and 11 showed atrophic changes and dense mucopurulent secretion. The av. duration of smoking for these groups was 3, 5, 8, 17, and 23 yr., resp. Bronchoscopic changes were correlated with the duration of smoking, but not with daily cigarette consumption.

69-971 HARMFULNESS OF TOBACCO SMOKE TO THE RESPIRATORY TRACT. (Pol.) Sekula, J. (Laryn. Clin., Cracow, Poland). Prezgl. Lek. 24(6):552-555, 1968.

Between 1946-1966, 989 pts. (959 men, 30 women) were treated for cancer of the larynx at the Otolaryngological Clinic of the Cracow Academy of Medicine; 873 (88.3%) were heavy smokers (15-60 cigarettes/day for 20-40 yr.), only 2% (11 men, 9 women) were nonsmokers and no exact data as to smoking habits were obtained from 96 pts. (9.7%). The effect of tobacco smoke on the tracheal and bronchial mucosa and ciliary movement, and the risk of cancer due to smoking are discussed.

69-972 MULTIPLE PAPILLOMATOSIS OF THE LOWER RESPIRATORY TRACT. CLINICAL AND PATHOLOGIC STUDY OF ELEVEN CASES. (E.) Al-Saleem, T. (Temple U., Philadelphia, Pa.), A. R. Peale and C. M. Norris. Cancer 22(6):1173-1184, 1968.

Data on 11 pts. with multiple papillomatosis of the larynx trachea, bronchus and lung (in decreasing frequency of involvement) seen over a 50-yr. period are presented. Childhood onset was seen in 7/11. One of these pts. remained free of disease between the ages of 8 and 23, when laryngeal papillomatosis recurred; involvement with the same benign process was seen at age 43; this pt. was an early smoker (cigarettes and pipe). Adult onset was noted in 4/11; 1/4 was a nonsmoker and 3/4 were heavy smokers. Malignant transformation of the papillomas to squamous cell carcinoma was seen in 2/4 (both smokers).

69-973 THE EPIDEMIOLOGY OF ORAL AND OROPHARYNGEAL CANCER. A REPORT OF THE STUDY IN MAINPURI DISTRICT, UTTAR PRADESH, INDIA. (E.) Wahi, P. N. (Sarojini Naidu Med. Coll., Agra, India). Bull. WHO 38(4):495-521, 1968.

Of 600 new cancer cases seen from March, 1964 to September, 1966, 346 were tumors of the mouth and oropharynx (224/346 of the buccal mucosa). Of the mouth tumors, 121 were seen in 1964, 27/121 from the Mainpuri District (a rural area about 75 miles from Agra). The incidence of mouth cancer in this district was 21.4/100,000/yr. (120.85 in men, 51.15 in women) and increased with age. Among the most significant etiologic factors associated with mouth cancer were tobacco chewing (especially of a local blend of tobacco, slaked lime, betel and powdered cloves or camphor), smoking of very short local cigarettes (2-3 inches long) or cigars, and high consumption of alcohol (especially whisky). Tobacco chewing from childhood or early adulthood was associated with a high oral cancer risk, but the age when smoking was begun apparently did not affect the risk. The risk was highest in persons who regularly drank and used tobacco in both forms. Oral hygiene and dietary factors (vegetarianism) had no significant effect on the oral cancer risk. The etiologic significance of (socioeconomic status, education, etc.) was probably due to their modifying or influencing the use of tobacco and alcohol.

69-974 CIGARETTE SMOKING AND PERIODONTAL DISEASE. (E.) Solomon, H. A. (Roswell Park Mem. Inst., Buffalo, N. Y.), R. L. Priore and I. D. J. Bross. J. Amer. Dent. Ass. 77(5): 1081-1084, 1968.

The prevalence of periodontal disease was studied in 7191 white adults (age 20-79), including 3552 (428 men, 3124 women) who had never smoked and 3639 (1754 men, 1885 women) who smoked cigarettes only. The prevalence of periodontal disease in smokers was much higher than in nonsmokers. In the smokers, the periodontal disease prevalence in women was closer to the male prevalence in the younger men and women than in the older pts. (in whom the prevalence was closer to the values for nonsmokers). This was related to lower cigarette consumption in the older women. The incidence of periodontoclasia and tooth loss was also significantly elevated in the smokers.

69-975 CIGARETTE SMOKING AND CANCERS OF THE URINARY TRACT: GEOGRAPHIC VARIATION IN THE UNITED STATES. (E.) Fraumeni, J. F., Jr. (NCI, Bethesda, Md.). J. Nat. Cancer Inst. 41(5):1205-1211, 1968.

Age-adjusted 1956-1961 mortality rates/100,000 from bladder, kidney or lung cancer and leukemia were compared to 1960 individual cigarette consumption (estimated from state sales tax data) and urbanization, for the District of Columbia (D.C.) and 43 states (excluding Colorado, Georgia, Hawaii, New Hampshire, North Carolina and Virginia). Bladder cancer (BC) mortality was 4.04-6.54 in D.C. and 22 states (highest in Nevada) and 2.86-3.95 in the other states; correlation coefficients (r) with smoking and urbanization were +0.73 and +0.63, resp. Lung cancer (LC) mortality was 23.03-27.27 in D.C. and 9 other states, 14.11-22.83 in 31 states and 12.01-13.58 in Utah, North Dakota, and Idaho (increasing order); correlation coefficients with smoking and urbanization were +0.71 and +0.56, resp. Kidney cancer (KC) mortality was correlated with smoking (r = +0.49) but not urbanization. Correlations between BC and either LC and KC were significant (r = +0.72 and +0.40, resp.), but the correlation between LC and KC was not significant. Leukemia mortality was 6.08-7.80 in D.C. and 37 states, 8.15-8.28 in South Dakota and Minnesota and 4.90-5.95 in Alaska, Wyoming, South Carolina, New Mexico (increasing order); no correlation with smoking or urbanization was noted. Removing the effects of smoking did not remove the correlation between urbanization and LC or BC; removing the effects of urbanization did not remove the correlation between smoking and BC, LC or KC.

69-976 PULMONARY AND HEPATIC ONCOGENESIS DURING TREATMENT OF MALE RF MICE WITH DIMETHYLNITROSAMINE. (E.) Clapp, N. K. (Oak Ridge Nat. Lab., Tenn.), A. W. Craig and R. E. Toya, Sr. J. Nat. Cancer Inst. 41(5):1213-1227, 1968.

In 126 male RF mice treated with dimethylnitrosamine (DMN; 0.94 mg/kg/day in drinking water) from age 8-10 wk. throughout life, the mean survival time was reduced 40% (by comparison with untreated controls). Liver tumors (mostly hemangiosarcomas and hemangioendotheliomas, in contrast to the high incidence of hepatomas induced by diethylnitrosamine) developed in 97% of the DMN-treated mice; lung tumors resembling the spontaneous adenomas (sometimes progressing to papillary adenocarcinoma) of control mice developed in 99%. In untreated controls, the incidence of liver and lung tumors was 4% and 39%, resp. The incidence of tumors of other sites (including leukemia) was about the same in treated and untreated mice.

69-977 ANOMALOUS ANTIGENS AND CORRESPONDING ANTIBODIES IN THE ACTION OF 3-HYDROXYANTHRANILIC ACID IN VIVO. (Rus.) Korosteleva, T. A. (Petrov Res. Inst. Oncol., Leningrad, USSR) and A. T. Zasypka. Vop. Onkol. 14(9): 53-58, 1968.

A study of the immunological specificity of the combination of proteins with 3-hydroxyanthranilic acid (HAA; 0.1 mg/g/day x 4-30 p.o.) in strain CC57W mice showed that HAA could be the active hapten in protein antigens, inducing the production of specific antibodies in heterologous hosts. Rabbit immune sera against synthetic HAA-azoproteins (HAA-A) formed 3-4 precipitation lines with homologous azoprotein and 2-3 with homologous, non-processed protein. Hyperimmune sera against HAA-A in some experiments reacted with heterologous, non-carcinogen-bound proteins, forming 1-2 precipitation lines, but with heterologous HAA-A these sera gave 2-3 lines. The antibodies formed were directly against HAA and were found in isolated precipitation zones in the agar. HAA as a hapten was absent in the tissues and sera of mice admin. 4 doses of HAA. After 15 doses, HAA was noted as a hapten in the liver and sera; after 30 doses it was present only in liver. In mice receiving 4-30 doses of HAA, the agent (in the form of an isolated precipitation zone in the gel) could not be detected in kidney, spleen and lung tissue; there was also no difference in the serum auto-antibody content between controls and treated animals. Liver antigens of both treated and control animals showed 1-2 precipitation lines in reactions with sera of treated and control animals; and in interaction with the same sera, lung, spleen and kidney antigens formed 1 precipitation line. In all 3 experimental groups, sera and tissue extracts (liver, lung, spleen and kidney), reacting with synthetic human serum azoproteins, showed no antibodies in the form of additional precipitation lines. Sera of treated and control animals showed 1 precipitation line with azoproteins, while spleen proteins formed a conc. precipitation zone around the central hole; this line was larger and more pronounced with proteins from mice admin. 15 doses of HAA than with proteins from controls.

69-978 GLYCOLYTIC ACTIVITY AND ASSOCIATED ENZYMES IN RAT LIVER DURING CARCINOGENESIS. (Uk.) Rubenchik, B. L. (Res. Inst. Nutr. Hyg., Kiev, USSR) and A. S. Petrun. Ukr. Biokhim. Zh. 40(3):319-322, 1968.

In male rats fed for 2-24 wk. with p-dimethylaminoazobenzene (DAB; 0.06% in diet), hepatic glycolytic activity and phosphofructokinase (PFK) activity remained unchanged after 2 wk. of DAB admin. After 10 wk. and at the beginning of tumor development (18 wk.), glycolytic activity was 4-fold higher than control levels (liver of untreated rats) and PFK was elevated 2.7-fold. After 24 wk., both activities were elevated almost 3-fold; in tumor tissue, glycolytic and PFK activities were 5- and 4-fold higher than in the liver of untreated control rats, resp. Hepatic fructose diphosphate activity (also involved in both glycolysis and gluconeogenesis) remained unchanged during DAB carcinogenesis but was somewhat below control levels in the tumor tissue. Hepatic aldolase activity was reduced during the first 2 wk. of DAB admin.; thereafter, it was within control limits.

69-979 DETECTION OF HUMORAL ANTIBODIES IN RATS IN THE EARLY STAGES OF CARCINOGENESIS. (Rus.) Khundanova, L. L. (Petrov Res. Inst. Oncol., Leningrad, USSR). Vop. Onkol. 14(10):53-55, 1968.

Carcinogenic, hepatotropic amino compounds or their metabolites form complexes with liver proteins. The possibility that these new antigens induce the formation of specific humoral antibodies in the host was examined in inbred rats fed p-dimethylaminoazobenzene (DAAB; 10 mg/day). The animals were sacrificed after 4-100 days and their sera pooled. Precipitin reactions (carried out in test tubes) did not reveal the presence of antibodies against these anomalous liver antigens, but when sera of animals treated for 60 or 100 days were reacted in agar gel with liver antigens from similarly treated rats, 2 precipitin lines appeared. Sera from untreated animals or rats treated for less than 60 days occasionally gave 1 precipitin line with liver antigens.

69-980 ACCELERATION OF LIVER CELL PROLIFERATION IN VITRO BY N-NITROSODIMETHYLAMINE. (E.) Takayama, S. (Cancer Inst., Tokyo) and N. Inui. Gann 59(5):437-438, 1968.

In primary cultures of minced liver cells from newborn Buffalo rats, addition of DMN at nontoxic conc. (5 or 10 µg/ml for 24 hr.) induced cell proliferation and permitted the cells to survive subculturing. With 10 µg/ml DMN the cells showed changes in the growth pattern (disorientation and formation of dense layers) and reached the stationary phase after about 55 days in primary culture; after subculture, growth continued for over 90 days. At 5 µg/ml DMN, growth decreased after 85 days and stopped after 90-100 days. Untreated liver cells showed signs of degeneration after 40 days and could not be subcultured. Lung fibroblasts treated with DMN and control lung fibroblasts maintained their typical growth patterns and grew successfully for over 100 days, with 4 subcultures during this time.

69-981 LIVER REGENERATION AFTER DIETHYLNITROSAMINE POISONING. (Ger.) Seidel, H. J. Naturwissenschaften 55(11):548, 1968.

In female Wistar rats (175 g) treated with diethylnitrosamine (100 mg/kg p.o. = about 30% of LD$_{50}$), the patterns of thymidine uptake into hepatic DNA and the mitotic index were about the same in the mesenchymal and parenchymal cells, with marked increases after 48-72 hr. and values consistently above control levels through day 7. These changes were the same as those seen after CCl$_4$ poisoning.

69-982 EFFECT OF AGE AND SEX ON HEPATIC LESIONS IN BUFFALO STRAIN RATS INGESTING DIETHYLNITROSAMINE. (E.) Reuber, M. D. (NCI, Bethesda, Md.) and C. W. Lee. J. Nat. Cancer Inst. 41(5):1133-1140, 1968.

Liver carcinogenesis by diethylnitrosamine (DENA; 0.0114% in diet for 26 wk.) in Buffalo rats depended on sex and the age of the animals at the beginning of treatment. None of the females developed cirrhosis. The most advanced hepatic lesions in 52-wk.-old rats were hyperplasia in 6/25 (3/13 males, 3/12 females) and 2 carcinomas (both in females). In 24-wk.-old rats, hyperplasia was seen in 4/25 (2/13 females, 2/12 males), nodules in 5/25 (3/13 and 2/12, resp.) and carcinoma in 11/25 (7/13 and 4/12, resp.); hemangioendothelial sarcomas were also seen in 2/7 females with carcinoma. In the 12-wk.-old rats, DENA induced carcinomas in 6/13 males and 11/13 females and sarcomas in 3/6 and 3/11 with carcinoma, resp. The highest tumor incidence was seen in the 4-wk.-old rats (carcinomas in 9/15 males and 14/14 females; sarcomas in 3/9 and 5/14, resp.); these animals also showed the largest tumors and the largest number of tumors/rat, and the only pulmonary metastases in the experimental group. Undifferentiated carcinomas were more frequent in the younger animals and the av. survival times were shorter than in the 24- or 52-wk.-old rats.

69-983 CHARACTERISTIC LESIONS OF METHYLAZOXYMETHANOL-INDUCED LIVER DAMAGE. A COMPARATIVE ULTRASTRUCTURAL STUDY WITH DIMETHYLNITROSAMINE, HYDRAZINE SULFATE, AND CARBON TETRACHLORIDE. (E.) Ganote, C. E. (NIH, Bethesda, Md.) and A. S. Rosenthal. Lab. Invest. 19(4):382-398, 1968.

In male Osborne-Mendel rats, acute subcellular changes in the liver induced by i.p. admin. of methylazoxymethanol (MAM; cycasin aglycone; 60-110 mg/kg) and equivalent doses of dimethylnitrosamine (DMN; 35-75 mg/kg) were similar (segregation of nucleolar components, depletion of nucleolar granular material, decreased ribosomes, hypertrophy of the smooth endoplasmic reticulum, formation of membrane whorls), indicating protein synthesis inhibition and alteration of nucleolar RNA synthesis. No signs of an early block of RNA synthesis were seen after CCl$_4$ admin. (0.25 ml/100 g); the acute subcellular changes (involving the polysomes, rough and smooth endoplasmic reticulum, Golgi apparatus and microsomes) suggested that CCl$_4$ had a more direct effect on cytoplasmic protein synthesis than DMNA. Ultrastructural changes induced by MAM, DMNA and CCl$_4$ in common were fat accumulation and loss of polysomes. The subcellular changes induced by hydrazine sulfate (260 mg/kg) were distinctive; nuclear, nucleolar and mitochondrial swelling, apparent increases in microbodies and lipid-like material in the Golgi cisternae.

69-984 DIFFERENT SUSCEPTIBILITIES OF CHICK EMBRYO LIVER CELLS IN VITRO TO AFLATOXIN, ACTINOMYCIN D, AND MITOMYCIN C. (E.) Terao, K. (Chiba U., Japan) and K. Miyaki. Z. Krebsforsch. 71(3):199-207, 1968.

Nucleic acid and protein syntheses were studied by incorporation of ^{3}H-labeled precursors (thymidine, uridine or proline) in primary cultures of liver cells from 12-day-old chick embryos, after 5 min.-6 hr. of incubation with inhibitors. Aflatoxin (a mixture of B and G; usually 1 μg/ml) inhibited RNA synthesis first, followed by inhibition of protein and DNA synthesis. Parenchymal cells were more susceptible than mesenchymal cells. In cells exposed to actinomycin D (1 μg/ml), RNA synthesis in the parenchymal cells was inhibited by only 30% after 6 hr., whereas RNA synthesis in the mesenchymal cells fell to 36% of pretreatment levels after 1 hr. of exposure, with the appearance of typical nucleolar caps. Protein synthesis in the mesenchymal cells remained constant for 3 hr., then decreased suddenly. Mitomycin C (10 μg/ml) had little effect at first on RNA synthesis in either cell type; later, RNA and protein synthesis were inhibited moderately, first in the parenchymal cells and then in the mesenchymal cells.

69-985 ANTINEOPLASTIC ACTIVITY OF AFLATOXIN B$_1$. (E.) Green, S. (Dept. HEW, Washington, D. C.). Nature (London) 220(5170):931-932, 1968.

In male Holtzman albino rats with 1-day-old ascites Schmidt's Yoshida hepatoma, 5 days of treatment with aflatoxin B$_1$ (AB; 0.5 or 1.0 mg/kg/day i.p. in dimethyl sulfoxide) significantly increased the av. survival time at both doses. AB did not eliminate the tumor (invasion and ascites developed after 7 days), but the survival times between 6 and 11 days after tumor inoc. were significantly higher (all untreated and vehicle-treated controls died within 9 days). The reference standard antitumor agent, triethylene melamine (TEM), was more effective than AB (100% survival in the time period studied).

69-986 THE PRODUCTION OF AFLATOXIN M ON VARIOUS SUBSTRATES. (E.) Purchase, I. F. H. (Council Sci. Indust. Res., Pretoria, South Africa) M. Steyn and H. E. Pretorius. Mycopathologia 35(3-4):239-244, 1968.

Spores from 44 strains of *Aspergillus flavus* and 6 strains of *A. parasiticus* were cultivated in liquid medium (sucrose-yeast extract) or on substrates containing peanut or corn meal, rice and delintered, crushed cottonseed. The 16 strains cultivated on cottonseed produced only traces of aflatoxin M (AM). Measurable conc. of AM were produced by 20/27 strains grown on rice, 13/27 grown on peanut meal, 14/27 grown in liquid medium and 13/16 grown on corn meal substrates. Of the 50 strains tested, 9 produced only aflatoxins B (AB) and/or G, 14/50 produced traces of AM as well and 27 produced larger conc. of AM and varying conc. of other aflatoxins. No direct relationship was seen between AB and AM synthesis; some strains produced large conc. of AM on 1 substrate but not on others.

69-987 AFLATOXIN METABOLISM BY LIVER MICROSOMAL PREPARATIONS OF TWO DIFFERENT SPECIES. (E.) Portman, R. S. (Virginia Polytechnic Inst., Blacksburg), K. M. Plowman and T. C. Campbell. Biochem. Biophys. Res. Commun. 33(5):711-715, 1968.

Liver microsomes from 2-mo.-old rats (Sprague-Dawley derived) and mice (ICR derived) were incubated with aflatoxin B_1 ^{14}C-labeled (AB; conc. not specified) and the conversion of AB to its hydroxylated derivative aflatoxin M_1 (AM) was studied by chromatography. Analysis of the apparent Michaelis constants and max. velocities of AB metabolism showed a significantly greater rate of AB metabolism (at any AB conc.) in mouse liver. These results, combined with those of an earlier study, led to the conclusion that AB is transported more slowly across the liver cell membrane, but metabolized more rapidly to AM within the liver cell, in mice than in rats. Since AB is more toxic in rats than in mice and induces liver tumors in rats but not in mice, it is concluded that AB is more toxic than its metabolites.

69-988 INHIBITION BY AFLATOXIN B_1 OF HYDROCORTISONE INDUCTION OF RAT LIVER TRYPTOPHAN PYRROLASE AND TYROSINE TRANSAMINASE. (E.) Wogan, G. N. (Massachusetts Inst. Tech., Cambridge) and M. A. Friedman. Arch. Biochem. 128(2):509-516, 1968.

In intact or adrenalectomized male Fischer rats (40-75 g), hydrocortisone acetate (HA; 150 mg/kg i.p.) induction of liver tryptophan pyrrolase and tyrosine transaminase was inhibited by aflatoxin B_1 (AB; 1 mg/kg i.p.), if AB was admin. simultaneously with HA or within the next 2 hr. The induction process was insensitive to AB after that time, although puromycin (10 mg/rat i.p.) inhibited enzyme induction when admin. 3-4 hr. after HA. Toxic doses of AB (3 or 5 mg/kg i.p.) inhibited enzyme induction for at least 10 days, but did not inhibit tryptophan (600 mg/kg)-induced enzymes under the same conditions. The responses to AB (1 mg/kg) and actinomycin D (1 mg/kg) were qualitatively similar, suggesting similar mechanisms of inhibition of liver enzyme induction.

69-989 ELECTRONIC PROPERTIES OF N-HETEROAROMATICS. XXIV. INTERACTIONS OF THE CARCINOGEN 4-NITROQUINOLINE 1-OXIDE WITH THIAMINE. COMPLEX FORMATION AND SUBSTITUTION REACTION. (Jap.) Okano, T. (Tohoku U. Sch. Med., Sendai, Japan) and K. Tsuji. Yakugaku Zasshi (J. Pharm. Soc. Jap.) 88(9):1103-1111, 1968.

See also abstract nos.: 901,907,911,914,915,917,927,1081,1083,1084,1085,1086

69-990 EFFECT OF TANNIC ACID AND ELLAGIC ACID ON THE INFECTIVITY OF POTATO VIRUS X IN TISSUE CULTURE. (E.) Verma, V. S. (Indian Agric. Res. Inst., New Delhi) and S. P. Raychaudhuri. Naturwissenschaften 55(11):546, 1968.

In cultures of callus tissue from potato virus X (PVX)-infected tobacco plants, tannic acid (60 ppm) stimulated PVX infectivity and callus growth, whereas ellagic acid (200 ppm) inhibited callus growth.

69-991 INVOLVEMENT OF THE NUCLEOLUS IN VIRAL SYNTHESIS IN THE CELLS OF PRIMARY RENAL TUMORS OF LEOPARD FROGS. (E.) Jacob, J. (U. Edinburgh, Scotland). Cancer Res. 28(10): 2126-2136, 1968.

Marked nucleolar changes were seen in the Lucké frog kidney adenocarcinoma. The fibrillar region formed clumps which later became fragmented; when fragmentation was seen, virus particles appeared in the nucleus. The materials of the clumps or their dissolution products seemed to be necessary for viral replication. The viral nucleoids or similar bodies apparently began to form in intimate association with these clumps, but no preferential site for the formation of the viral capsids was noted.

69-992 VERRUCAE: VIRUS STRUCTURE, LOCALIZATION OF ANTIGENS, AND COMPARISON WITH THE SHOPE PAPILLOMA. (E.) Noyes, W. F. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.). Cancer Res. 28(7):1321-1324, 1968.

The ultrastructures of the human verruca virus (VV) and the rabbit Shope papilloma virus (SPV) were very similar. Both consisted of spherical and abnormal elongated forms (the elongated forms were probably the result of errors in synthesis in some of the virus-producing host cells). The normal SPV particle was slightly larger than the VV particle (av. diameters about 61 and 57 mμ, resp.) and its capsid contained more capsomeres (60-70, compared to 42 in VV). Immunofluorescence studies of human warts (using a rabbit anti-VV serum) demonstrated viral antigens in the nuclei of cells of the skin layers where cellular degeneration and necrosis were taking place (stratum granulosum and stratum corneum), but not in the proliferating cells of the germinal layer. This distribution was identical to that of SPV in rabbit skin.

69-993 ONCOGENIC ACTION OF BOVINE PAPILLOMA VIRUS IN HAMSTERS. (E.) Robl, M. G. (U. Wisconsin, Madison) and C. Olson. Cancer Res. 28(8):1596-1601, 1968.

Supernatant fluids containing bovine papilloma virus (BPV; 10^{-1}-10^{-5} dilution, s.c.), obtained from several cattle with cutaneous fibropapilloma, induced well-differentiated s.c. fibrosarcomas in 67-100% of hamsters in several experiments. The av. induction period was 39 wk. (range, 25-56 wk.); the tumor incidence was independent of the age at the time of BPV inoc. (2-52 wk.). In 1 experiment, the tumor incidence was 0% at a virus dilution of 10^{-5}, 25% (1/4 hamsters) at 10^{-4} and 100% (13/13 animals) at dilutions of 10^{-1} to 10^{-3}. About 10% of the animals developed disseminated tumor nodules. Several of the tumors were later transplanted to other hamsters.

69-994 DETECTION OF BIOLOGICALLY DEFECTIVE MOLECULES IN COMPONENT I OF POLYOMA VIRUS DNA. (E.) Thorne, H. V. (U. Glasgow, Scotland), J. Evans and D. Warden. Nature (London) 219(5155):728-730, 1968.

The infectivity of purified polyoma virus DNA (in mouse embryo monolayers) was studied after separation of its components by ultracentrifugation. The infectivity of component I was not uniformly distributed throughout the peak, but was highest at the fastest sedimentation rate. The peak of specific infectivity of the other active component (component II) was also seen at the fastest sedimentation rates. The rapidly sedimenting denatured component I DNA consisted of 2 partly resolved peaks at about 50S, containing most of the infectivity after alkali treatment (the faster peak apparently contained most of the infectivity and the slower peak seemed inactive). These and other results suggested that most of the encapsidated viral DNA is non-infectious.

69-995 ATTEMPT TO PROTECT NEWBORN HAMSTERS AGAINST POLYOMA TUMORS BY REPEATED INJECTIONS OF THE VIRUS. (Fr.) Meyer, G. (Reg. Cancer Res. Ctr., Marseille, France), G. Cochet, M. Moutaffian and H. Bonneau. C. R. Soc. Biol. (Paris) 162(2):502-504, 1968.

Newborn Syrian hamsters were inoc. with polyoma virus (PV; Toronto "small-plaque" strain; 2 x 10^6 PFU), then treated for 4 wk. (1 inj./wk.) with the same doses of UV-irradiated (10,000 or 50,000 ergs/mm^3) or non-irradiated PV. No protection against tumor development was seen in this rapid tumor induction system.

69-996 REVERSION OF PROPERTIES IN CELLS TRANSFORMED BY POLYOMA VIRUS. (E.) Rabinowitz, Z. (Weizmann Inst. Sci., Rehovot, Israel) and L. Sachs. Nature (London) 220(5173): 1203-1206, 1968.

After cultivation on irradiated feeder cultures (rat embryo cells) or glutaraldehyde-fixed normal or polyoma virus (PV)-transformed hamster embryo cells, several clones of PV-transformed hamster cells, in which the transformed state had become hereditary, showed a high frequency of variants with a reversion of the characteristic properties of transformation. This reversion was not accompanied by a loss of the PV genome.

69-997 ISOLATION OF A RECEPTOR COMPLEX FOR A TUMOR SPECIFIC AGGLUTININ FROM THE NEOPLASTIC CELL SURFACE. (E.) Burger, M. M. (Princeton U., N. J.). Nature (London) 219(5153): 499-500, 1968.

A soluble inhibitor isolated by hypotonic shock from L-1210 mouse leukemia cells (chemically induced) prevented the agglutination of polyoma- or adenovirus-transformed BHK hamster cells and of adenovirus- or SV40-transformed 3T3 mouse cells, suggesting the presence of similar receptor sites. The soluble inhibitor contained N-acetylglucosamine (N-AG), a powerful hapten inhibitor of this agglutination reaction, as well as N-acetylgalactosamine. Periodate treatment neutralized the soluble inhibitor, suggesting that N-AG was in a terminal position, if not substituted on C-6, and if other periodate-sensitive carbohydrates are not as important as N-AG at the active site.

69-998 THE STUDY OF NORMAL AND MALIGNANT CELL ANTIGENS BY MIXED AGGLUTINATION. (E.) Metzgar, R. S. (Duke U. Med. Ctr., Durham, N. C.) and S. R. Oleinick. Cancer Res. 28(7):1366-1371, 1968.

A mixed agglutination method for detecting virus-specific cell surface antigens associated with transformation by SV40 is described. Results of the test in several cell lines: SV40-induced hamster tumor (TT 101-SV40), and SV40-transformed hamster cells (HE/LLE or HK/LLE), mouse embryonic fibroblasts (3T3-SV40) and human embryonic lung fibroblasts (WI-38 VA13A and WI-26 VA4) are described. The patterns of reactivity of the noninfected human cells (WI-38 and WI-26 embryonic lung fibroblasts) with several human isoantisera were not affected by SV40 transformation.

69-999 INFECTIVITY ASSOCIATED WITH SIMIAN ADENOVIRUS TYPE SA7 DNA. (E.) Burnett, J. P. (Lilly Res. Labs., Indianapolis, Ind.) and J. A. Harrington. Nature (London) 220(5173):1245, 1968.

Phenol-extracted DNA from simian adenovirus type 7 (SA7) had the same CPE as intact virus in CV-1 cells. Infectivity of the DNA was destroyed by DNase, but it was not affected by heat (56° C for 1 hr., which destroyed the infectivity of intact SA7) or SA7 type-specific antiserum. The titer of the viral progeny released from cultures showing a CPE was $10^{4.6}$-$10^{7.3}$ $TCID_{50}$/ml.

69-1000 T AND TUMOUR ANTIGENS OF ADENOVIRUS GROUP C-INFECTED AND TRANSFORMED CELLS. (E.) Gilden, R. V. (Flow Labs., Inc., Rockville, Md.), J. Kern, A. E. Freeman, C. E. Martin, R. C. McAllister, H. C. Turner and R. J. Huebner. Nature (London) 219(5153):517-518, 1968.

The properties of subgroup C (including types 1, 2, 5 and 6) of the oncogenic human adenoviruses (AV) are described. Subgroup C AV could transform rat embryo cells and produced a common T antigen and a subgroup-specific messenger RNA. Attempts to induce tumors in animals by inoc. of cells transformed by subgroup C AV failed. Sera from hamsters immunized with tumors induced by hybrid AV type 1-SV40 or AV type 2-SV40 reacted in high titer with T antigen from infected KB cells (free of SV40) and with rat cells transformed by subgroup C AV, but not with standard T antigens for AV types 7 or 12 (belonging to AV subgroups B and A, resp.). The T antigen reactivity of AV subgroup C was heat-labile. Synthesis of the T antigen of AV type 2 occurred under thermal separation conditions (applicable to types 7 and 12) in which viral antigen formation was inhibited by 99%.

69-1001 INDUCTION OF TUMORS IN RATS BY INJECTION OF ANTI-THYMOCYTE SERUM AND FIBROBLASTS TRANSFORMED IN VITRO BY ADENOVIRUS 2. (Fr.) Vandeputte, M. (U. Louvain, Belgium), J. Samaille, P. De Somer and P. Wattré. C. R. Acad. Sci. [D] (Paris) 267(12):1071-1073, 1968.

Adenovirus type 2 (AV2)-transformed Fisher rat embryo fibroblasts (cell line 8629), containing the AV2-induced T antigen (as demonstrated by complement fixation tests using sera from animals with tumors induced by hybrid AV2-SV40 virus), did not induce tumors after s.c. inoc. (1-5 x 10^6 cells) in normal or thymectomized newborn Fisher rats. After inoc. of these cells and treatment with rabbit anti-rat thymocyte serum (2 inj./wk. i.p. of 0.1 ml; 4-5 doses), 16/28 rats developed s.c. tumors (undifferentiated small cell sarcomas resembling AV2-induced hamster tumors), which were small (0.5-2 cm in diameter) and did not form metastases. An in vitro line of 1 of these tumors from an antiserum-treated rat (designated 8629 T 1) induced s.c. tumors in 12/16 antiserum-treated rats and 6/13 untreated animals, but the tumors developing in the untreated rats regressed completely within 3 wk. All animals admin. the antiserum (including those not developing tumors) developed a typical wasting syndrome.

69-1002 ONCOGENICITY OF MIXTURES OF ADENO-ASSOCIATED VIRUS AND ADENOVIRUS TYPE 12. (E.) Gilden, R. V. (Flow Labs., Inc., Rockville, Md.), J. Kern, T. G. Beddow and R. J. Huebner. Nature (London) 219(5149):80-81, 1968.

Adeno-associated viruses (AAV) types 1 or 2 were found in some stocks of human adenoviruses (AV), even after purification by density gradient centrifugation. Purified AAV, however, did not affect either the incidence or the induction times of tumors induced in newborn hamsters by AV type 12 (from an apparently AAV-free virus pool) at the dilutions tested (AAV conc. of 10^6 -10^{10}, based on an assumed particle:complement fixation ratio of 10^9--adenovirus constant at $10^{7.2}$ $TCID_{50}$/ml). Results of screening showed that 8/31 human AV (especially from the B group; types 3, 7, 14, 16 and 21) had tumor-inducing properties; the presence or absence of tumor-inducing properties was apparently not the result of chance inclusion of AAV in the purified virus preparations.

69-1003 ONCOGENICITY OF MIXTURES OF ADENO-ASSOCIATED VIRUS AND ADENOVIRUS TYPE 12. (E.) Gilden, R. V. (Flow Lab. Inc., Rockville, Md.), J. Kern, T. G. Beddow and R. J. Huebner. Nature (London) 220(5171):1139, 1968.

Further examination of the purified preparations of adeno-associated viruses types 1 and 2, which did not affect the oncogenicity of adenovirus type 12 in newborn hamsters (see the preceding abstract), demonstrated that the preparations used for purification were of low or no infectivity, even though virus particles were banded at the appropriate density.

69-1004 STUDIES ON INHIBITION OF VIRAL ONCOGENESIS. I. REDUCED TUMOR INCIDENCE IN HAMSTERS INOCULATED WITH ADENOVIRUS 12 AND TREATED WITH CLAM EXTRACTS. (E.) Li, C. P. (NCI, Bethesda, Md.), B. Prescott, B. E. Eddy, E. W. Chu and E. C. Martino. J. Nat. Cancer Inst. 41(5):1249-1253, 1968.

Crude extracts of fresh or frozen whole shucked clams (Mercenaria mercenaria) or extracts of the liver (digestive diverticulum) significantly inhibited s.c. tumor induction by adenovirus type 12 (C or Huie strains) in newborn hamsters.

69-1005 TRANSFORMATION IN CELL CULTURE OF SEX HORMONES BY ADENOVIRUS-12-INDUCED TUMOR CELLS AND NORMAL HAMSTER LUNG FIBROBLASTS. (E.) Lucis, O. J. (Dalhousie U., Halifax, Canada), E. S. McFarlane, J. A. Embil, Jr. and R. Lucis. Cancer Res. 28(8):1513-1519, 1968.

In several cell lines derived from random-bred Syrian hamsters of both sexes (normal adult lung fibroblasts; lung or peritoneal tumors induced by adenovirus 12 in newborn hamsters; a testicular tumor induced by i.p. inoc. of 1 of the lung tumor cell lines after 70 in vitro passages), sex hormone metabolic patterns were identical: rapid transformation of estrone to estradiol (especially in the tumor cells), a less efficient reduction of androstenedione to testosterone, and very low oxidation of estradiol to estrone. Sex hormone metabolism remained unchanged after several in vitro passages in hormone-containing media. The accelerated estrogen metabolism in the tumor cells was tentatively attributed to rapid cell growth and accelerated biochemical processes.

69-1006 ANTIBODY SYNTHESIS IN VITRO BY LYMPH NODES FROM HAMSTERS BEARING ADENOVIRUS 12 TUMOURS. (E.) Lefkowitz, S. S. (Med. Coll. Georgia, Augusta) and R. A. Reddick. Nature (London) 220(5174):1355-1356, 1968.

The specificity of antibody formation in vitro was studied in lymph nodes from Syrian hamsters with tumors induced by neonatal inoc. of adenovirus type 12 (AV12; Huie) and lymph nodes from weanling hamsters with s.c. transplants of these AV12-induced tumors (7/10 and 3/10, resp., showed serum antibodies to a viral antigen). The results indicated that lymph nodes from the hamsters with primary AV12-induced tumors had been "primed" to respond to AV12 antigens. After in vitro exposure to the antigens, the lymph nodes synthesized antibodies to a viral antigen eluted with 0.2m NaCl from DEAE-cellulose. It is concluded that lymph nodes from hamsters with primary and some secondary AV12-induced tumors can synthesize antibodies in vitro that cannot be detected in vivo. Addition of chloramphenicol to the culture fluid completely inhibited antigen synthesis.

69-1007 STUDIES ON THE PATHOGENESIS OF SIMIAN ADENOVIRUS-INDUCED TUMORS. III. THE HISTOPATHOLOGY AND ULTRASTRUCTURE OF INTRACRANIAL NEOPLASMS INDUCED BY SV20. (E.) Merkow, L. (U. Pittsburgh, Pa.), M. Slifkin, M. Pardo and N. P. Rapoza. J. Nat. Cancer Inst. 41(5): 1051-1070, 1968.

Intracerebral inoc. of the Chin (A57) strain of SV20 (from LLC-MK2 monkey kidney cells; a stock free of adeno-associated viruses and SV40) induced intracranial tumors within 24-87 days in 18/137 (13.2%) newborn non-inbred hamsters. These brain tumors were histologically undifferentiated; most of the cells were mononuclear, with a few multi- and meganucleated giant cells. The brain tumors were histologically identical to hamster tumors induced by SV20 after s.c. or i.p. inoc. Electron microscopic examination showed solitary or small groups of intra-nuclear and intracytoplasmic virus-like particles (with occasional replicative "budding" vacuoles containing many particles), resembling infectious SV20 in LLC-MK2 cells. An interrelationship between stacks of cisternal smooth endoplasmic reticulum, annulate lamellae and the nuclear envelope was noted in the tumor cells.

69-1008 AN ELECTRON MICROSCOPIC STUDY OF VIRUS PARTICLES IN SPONTANEOUS LEUKEMIA IN THE CAT. (E.) Laird, H. M. (U. Glasgow, Scotland), O. Jarrett, G. W. Crighton and W. F. H. Jarrett. J. Nat. Cancer Inst. 41(4):867-878, 1968.

Electron microscopic examination of tissues from 8 randomly selected cats with lymphosarcoma (3 multicentric, 5 alimentary) disclosed large numbers of complete and budding virus particles in tissues from 5/8 cats (lymph nodes 5/5, bone marrow 4/4 cases examined, spleen 3/5, thymus 2/5). Occasional single particles or single groups of virus particles were seen in the lymph node and/or spleen tissues of the other 3 animals. The virus particles, morphologically similar to the leukemia viruses, were most frequently associated with macrophages and lymphoid cells in the spleen and bone marrow; they were also observed extracellularly, budding into the extracellular spaces from the plasma membranes and intracytoplasmic vacuoles.

69-1009 REPLICATION OF LEUKEMOGENIC-TYPE VIRUS IN CATS INOCULATED WITH FELINE LYMPHOSARCOMA EXTRACTS. (E.) Laird, H. M. (U. Glasgow, Scotland), O. Jarrett, G. W. Crighton, W. F. H. Jarrett and D. Hay. J. Nat. Cancer Inst. 41(4):879-893, 1968.

Leukemia-type virus particles were seen in thin sections of spleen and bone marrow from a cat with spontaneous feline lymphosarcoma. Extracts or filtrates of tumor tissue were inoc. into adult cats or into newborn kittens (i.p.). Electron microscopic examination of blood pellets prepared 4-6 wk. later showed the same type of virus as in the donor animal, budding from the surface of the platelets and into platelet vacuoles; complete virus particles were seen free between the platelets and in the platelet vacuoles. No virus particles were seen in platelet pellets from uninfected kittens. Virus particles were found in bone marrow, spleen and thymus tissue from 2 kittens sacrificed 28 days after inoc.; leukemia developed in 2 kittens after 85-86 days.

69-1010 REPLICATION OF CAT LEUKAEMIA VIRUS IN CELL CULTURES. (E.) Jarrett, O. (U. Glasgow, Scotland), H. M. Laird, D. Hay and G. W. Crighton. Nature (London) 219(5153):521-522, 1968.

After inoc. into newborn kittens, cat leukemia (lymphosarcoma) virus (CLV) replicated within 28 days, being recovered from the platelets. After 4 such passages in vivo, cell-free extracts obtained from these animals and from leukemic cells of 2 cats with leukemia were passaged in vitro, in FL (cat embryo lung) or NK (primary cultures of mixed cells from newborn kittens) fibroblast cultures. Both mature and budding virus particles were seen in infected cells under the electron microscope, but no gross differences were seen between infected and noninfected cultures (which produced no virus particles). The CLV particles were about 100 mμ in diameter and appeared in intracellular vacuoles; they showed either a 3-membrane structure, or the dense internal core characteristic of the avian and mouse leukemia viruses and the virus seen in spontaneous and induced feline leukemia.

69-1011 CELL-FREE TRANSMISSIBLE LEUKOSES IN SYRIAN HAMSTERS, PROBABLY OF VIRAL AETIOLOGY. (E.) Graffi, A. (German Acad. Sci., Berlin-Buch), T. Schramm, E. Bender, I. Graffi, K.-H. Horn and D. Bierwolf. Brit. J. Cancer 22(3):577-581, 1968.

Cell-free extracts (CFE) of papovavirus (PV)-containing Syrian hamster skin tumors (ST) induced leukosis (L; usually lymphoma) after i.p. inoc. in 29-45% of 146 newborn Syrian hamsters of a strain free of spontaneous ST or L. No tumors developed in older animals of this strain, or in newborn animals of this strain inoc. s.c. with these CFE. These CFE were not leukemogenic in newborn mice or in newborn hamsters of a strain with a low incidence of spontaneous ST and L (about 5% and 3%, resp.), but they induced L (reticulosis and reticulum cell sarcoma) in 61.5% of 91 newborn rats of a Wistar strain with a low incidence (0.5%) of spontaneous L. CFE of the hamster and rat L were sometimes leukemogenic in newborn hamsters. No PV was seen in the hamster and rat L induced by CFE from the hamster ST, but the hamster L contained a few particles resembling mouse or avian leukemia virus. Filtered nutrient fluid from tissue cultures of the hamster ST and L, and cell-free nutrient fluid from tissue cultures (normal rat or hamster embryo and HeLa cells) inoc. with CFE from the hamster ST or L, induced L in 70%, 45% and 44% of newborn hamsters, resp. CFE from a peritoneal cavity sarcoma from a child induced tumors in newborn hamsters, but CFE from several rodent sources (normal organs, transplantable carcinomas and sarcomas) did not (no other details).

69-1012 TRANSMISSION OF A PIGMENTED MELANOMA IN GOLDEN HAMSTERS BY A CELL-FREE ULTRAFILTRATE. (E.) Epstein, W. L. (U. California Sch. Med., San Francisco), K. Fukuyama, M. Benn, A. S. Keston and R. B. Brandt. Nature (London) 219(5157):979-980, 1968.

An amelanotic variant of a spontaneous hamster melanoma, carried by more than 50 intraocular passages in rabbits, remained pathogenic to hamsters (producing a pigmented tumor) during this time. Cell-free ultrafiltrates from 4 of these hamster tumors (obtained after over 20 serial transplant generations in hamsters) were successfully transplanted (by intradermal inoc.) into 9/11 hamsters. Pigmented tumors developed in 5/9, black plaques in 2/9 and necrotic areas containing tumor cells in 2/9. The only difference between these tumors and the original tumor transplants was the absence of necrosis and hemorrhage in the tumors induced by cell-free filtrates. The tumor cells contained many virus-like particles (comparable in morphology to the known RNA-containing tumor viruses) in the cisternae and budding from membranes; except for their intracellular localization, they resembled Bernhard's Type C particles. The pigmented tumor cells apparently did not develop from the epidermis; they may have developed from dermal or hair follicle melanocytes, although no signs of involvement of the hair follicles were seen.

69-1013 THE EXTRACTION OF INTRACISTERNAL A-PARTICLES FROM A MOUSE PLASMA-CELL TUMOR. (E.) Kuff, E. L. (NCI, Bethesda, Md.), N. A. Wivel and K. K. Lueders. Cancer Res. 28(10):2137-2148, 1968.

The MOPC-104E plasma cell tumor, from mammary tumor virus (MTV)-free BALB/c female mice, showed numerous intracisternal Type A particles (resembling MTV). A method for isolating these virus particles in quantities sufficient for biochemical analysis is described. These particles were liberated from the microsomal vesicles by mechanical shear of microsomal preparations in the presence of Triton X-100, followed by sucrose density gradient centrifugation in citrate soln. The isolated particles retained their characteristic inner and outer shells, with some residual contamination by microsomal membranes; they consisted of about 80% protein, 14% phospholipids and 5-6% RNA. About 40-50% of the total RNA was apparently contributed by other cytoplasmic components.

69-1014 STUDIES ON 12 CELL LINES ESTABLISHED FROM MONONUCLEAR LEUKOCYTES OF CATTLE WITH LYMPHOSARCOMA. (E.) Hare, W. C. D. (U. Pennsylvania Sch. Vet. Med., Philadelphia), P. Lin and E. Zachariasewycz. Cancer 22(5): 1074-1084, 1968.

The characteristics of 12 cell lines derived from 4 cows with bovine lymphosarcoma are described and methods for their cultivation (including the importance of horse serum in the medium) are discussed. All of the cell lines were aneuploid, with karyotypes resembling those of the original tumor cells, indicating that the cell lines were tumor cells derived from the tumors of the diseased animals. Preliminary electron microscopic examination disclosed no virus-like particles in any of the cell lines.

69-1015 HERPES-TYPE VIRUS ISOLATED IN CELL CULTURE FROM TUMORS OF CHICKENS WITH MAREK'S DISEASE. I. STUDIES IN CELL CULTURE. (E.) Churchill, A. E. (Houghton Poultry Res. Stat., Huntingdon, England). J. Nat. Cancer Inst. 41(4):939-950, 1968.

Chicken kidney cell monolayers infected with the herpes-type virus (HTV) of Marek's disease (MD; avian leukosis) showed CPE, but no infectivity was demonstrable in the supernatant fluid and no infectious virus was isolated from disrupted cells. A microplaque assay for HTV in fluid medium is described. The adsorption period extended over 24 hr. There was little evidence of secondary plaque production up to 9 days after inoc.; addition of antiserum did not inhibit plaque formation. HTV-infected chicken kidney cells induced MD in 1-day-old chicks and produced pocks in the chick embryo chorioallantoic membrane, but did not induce tumors in newborn hamsters followed for up to 8 mo. after intracerebral or s.c. inoc.

69-1016 HERPES-TYPE VIRUS ISOLATED IN CELL CULTURE FROM TUMORS OF CHICKENS WITH MAREK'S DISEASE. II. STUDIES IN VIVO. (E.) Churchill, A. E. (Houghton Poultry Res. Stat., Huntingdon, England) and P. M. Biggs. J. Nat. Cancer Inst. 41(4):951-956, 1968.

Herpes-type virus (HTV) was isolated in cell cultures from 8/8 field outbreaks of Marek's disease (MD; avian leukosis), 30/38 tumors examined and 4 laboratory strains of MD previously maintained in vivo. Several experiments in chicks inoc. with HTV-infected cells demonstrated that HTV is associated with the etiology of MD. MD infectivity of the HTV-infected cells was entirely cell-associated and inhibited by 5-iodo-2'-deoxyuridine, demonstrating that HTV is a DNA virus.

69-1017 STRUCTURE AND DEVELOPMENT OF THE HERPES-TYPE VIRUS OF MAREK'S DISEASE. (E.) Epstein, M. A. (Middlesex Hosp. Med. Sch., London), B. G. Achong, A. E. Churchill and P. M. Biggs. J. Nat. Cancer Inst. 41(3):805-820, 1968.

Typical herpes virus-like particles (morphologically indistinguishable) were seen in chicken kidney cultures infected with 8/8 strains of Marek's disease (lymphoid leukosis). Hexagonal immature particles were seen in both the nucleus and the cytoplasm; larger mature particles were formed by budding at the nuclear envelope and cytoplasmic vacuoles. The capsid structure, surface configuration and CPE were typical of the herpes viruses. No virus particles were seen in uninfected cultures.

69-1018 WILD-TYPE GROSS LEUKEMIA VIRUS. I. SOLUBLE ANTIGEN (GSA) IN THE PLASMA AND TISSUES OF INFECTED MICE. (E.) Aoki, T. (Sloan-Kettering Inst. Cancer Res., New York,

N. Y.), E. A. Boyse and L. J. Old. J. Nat. Cancer Inst. 41(1):89-96, 1968.

The soluble antigen associated with Gross mouse leukemia virus (G soluble antigen; GSA), demonstrable in tissue extracts and plasma from Gross virus-infected mice and from mice of strains with a high spontaneous leukemia incidence (G+ strains), was serologically distinguishable from the soluble antigens found in the plasma of mice infected with Friend, Moloney and Rauscher leukemia viruses. GSA was believed to be a subunit of the virus coat with type-specific antigenicity (in contrast to the internal group-specific antigen detectable by immunoprecipitation); it was filterable at 10 mμ and heat-labile. Detection of GSA in the blood (where it was found throughout life) served to distinguish mice with a high leukemia risk resulting from natural infection with Gross virus in the absence of an accompanying immune response.

69-1019 WILD-TYPE GROSS LEUKEMIA VIRUS. II. INFLUENCE OF IMMUNOGENETIC FACTORS ON NATURAL TRANSMISSION AND ON THE CONSEQUENCES OF INFECTION. (E.) Aoki, T. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.), E. A. Boyse and L. J. Old. J. Nat. Cancer Inst. 41(1):97-101, 1968.

The effects of host genotype on the transmission of wild-type Gross leukemia virus (GLV) was studied in several strains of mice. Gross soluble antigen (GSA) was always present in the sera of mice of high-leukemia strains; in populations segregating for H-2 histocompatibility antigens, the H-2^k genotype favored the presence of GSA (indicating immune tolerance). The H-2^b genotype favored the presence of naturally occurring Gross (G) antibody in the blood, indicating a lack of tolerance. In the hybrid progeny of various crosses between mice of strains with or without G antigen (G+ and G-, resp.), the proportion of GSA-positive mice was determined by the direction of the cross (G+ female x G- male or the reverse) and by the genotype contributed by the G- parent (resistant or sensitive to Passage A GLV). G antibody was most frequent in the highly-resistant C57BL/6 mice and their hybrids, and rare in the G-, GLV-sensitive C3Hf/Bi mice and their hybrids.

69-1020 WILD-TYPE GROSS LEUKEMIA VIRUS. III. SEROLOGICAL TESTS AS INDICATORS OF LEUKEMIA RISK. (E.) Aoki, T. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.), E. A. Boyse and L. J. Old. J. Nat. Cancer Inst. 41(1): 103-110, 1968.

A high correlation between the presence of Gross soluble antigen (GSA) in the blood and the development of leukemia was seen in progeny of mice of the high-leukemia AKR strain (designated G+, with Gross [G] antigen in the lymphoid tissues throughout life) and the low-leukemia C3Hf/Bi strain (designated G-). All AKR female x C3H male progeny were GSA+ at the earliest age tested and the spontaneous leukemia incidence was 96%. In progeny of the reciprocal cross (C3H female x AKR male) the leukemia incidence was 56%. Two types of families were seen in mice of the C3H x AKR progeny: some became GSA+ and showed a high leukemia incidence (95% in 1 family), while others remained GSA- and showed a lower leukemia incidence (10% in 1 family). The difference in leukemia incidence between families of the same genotype may reflect maternal immunization, virus transmission by G+ males or cagemates, and/or congenital infection.

69-1021 CULTIVATION OF GROSS VIRUS-INDUCED MURINE THYMIC LYMPHOMA CELLS IN VITRO. (E.) Imagawa, D. T. (UCLA Sch. Med., Torrance, Calif.), H. Issa and M. Nakai. Cancer Res. 28(10):2017-2026, 1968.

The characteristics of leukemic lymphoblast cell lines from thymic lymphomas induced in AKR/Jax, C3H/eB/FeJ, hybrid Swiss and C57BR/cd mice by Gross passage A leukemia virus are discussed. Typical Gross passage A virus was produced by 3/4 cell lines (studies of 1 cell line were incomplete at the time of report), as shown by electron microscopic examination and bioassay in newborn mice. Single-cell clones of these leukemias were also established.

69-1022 DIFFERENT DISTRIBUTION OF LEUKEMOGENIC VIRUSES IN AN ASCITIC CHLOROMA DERIVED FROM FRIEND LEUKEMIA. (Fr.) Chamorro, A. (Pasteur Inst., Paris). C. R. Acad. Sci. [D] (Paris) 267(7):823-825, 1968.

An ascites chloroma, induced by Friend leukemia virus (FLV) in Swiss mice and transplanted for 69 passages, was separated into 3 cell-free fractions with different leukemogenic activity in newborn Swiss mice (after i.p. inoc.). A cell extract (inoc. into 68 mice) induced leukemia in 34/52 survivors (65%); 21/34 (61%) developed FLV-type leukemia (4/21 showed FLV-type erythroblastosis) and 13/34 (39%) developed myeloid leukemia. The supernatant of the ascites fluid (inoc. into 36 mice) induced leukemia in 13/22 survivors (59%); 3/13 (23%) developed FLV-type leukemia and 10/13 (77%) developed myeloid leukemia, with FLV-type erythroblastosis (mixed myeloid leukemia) in 2/3 and 2/10, resp. A filtered extract of this supernatant fluid (inoc. into 41 mice) induced leukemia in the same proportion of the survivors as the supernatant fluid itself (19/32 = 59%) and the relative proportions of FLV-type and myeloid leukemia were similar (5/19 and 14/19 = 26% and 74%, with FLV-type erythroblastosis in 1/5 and 1/14, resp.), but 4/14 myeloid leukemias were of the chloroleukemia type. The max. survival time in inoc. mice was 697 days; survival times in mice with myeloid and FLV-type leukemia were 109-523 and 110-580 days, resp. (av. survival times and latent periods are not stated).

69-1023 RELATIONSHIP BETWEEN FRIEND VIRUS AND AN ASSOCIATED LYMPHATIC LEUKAEMIA VIRUS.

(E.) Dawson, P. J. (U. Oregon Med. Sch., Portland), R. B. Tacke and A. H. Fieldsteel. Brit. J. Cancer 22(3):569-576, 1968.

The relationship between Friend leukemia virus (FLV) and a lymphatic leukemia virus (LLV) obtained from Scott-Russ rats inoc. with FLV was studied in BALB/c mice and in Scott-Russ or Sprague-Dawley rats. Both viruses were leukemogenic to both mice and rats. The leukemias were pathologically different, with different latent periods, and the viruses showed different sensitivities to ether (FLV was completely inactivated, while LLV was only partially inactivated). Cross-neutralization and immunodiffusion tests demonstrated a close antigenic relationship between FLV and LLV. Serial passage of LLV in rats and ether treatment of the virus resulted in strains that did not induce FLV-type leukemia in BALB/c mice, but attempts to remove the lymphatic leukemia component from FLV were unsuccessful. It is suggested that FLV is defective and requires the presence of LLV as a helper.

69-1024 A QUANTITATIVE SPLEEN COLONY ASSAY METHOD FOR TUMOR CELLS INDUCED BY FRIEND LEUKEMIA VIRUS INFECTION IN MICE.

(E.) Thomson, S. (Ontario Cancer Inst., Toronto, Canada) and A. A. Axelrad. Cancer Res. 28(10):2105-2114, 1968.

This method for titrating Friend leukemia virus (FLV)-induced leukemia cells (from the tissues of FLV-infected mice) depended on the use of (C3H x C57BL)F_1 hybrid mice, which accepted tumor cell transplants from C3H mice but were resistant to spleen focus induction by FLV, even after large doses of radiation (up to 6000 rads of ^{60}Co). Results of the assay of FLV-induced tumor cells (on the basis of tumor colony-forming units) were comparable in irradiated and unirradiated mice. A specific antiserum, added to FLV-infected spleen cells before i.v. inj. into irradiated mice, was cytotoxic only to the antigen-containing cells, which permitted the differentiation of normal hematopoietic colonies from FLV-induced tumor colonies in the spleen. Evidence is presented to show that the spleen colonies resulted from neoplastic growth of the tumor cells (the number of colonies/spleen was directly proportional to the number of nucleated cells inj.) and were not induced by the FLV infection.

69-1025 MUTANT SL ALLELES OF MICE AFFECT SUSCEPTIBILITY TO FRIEND SPLEEN FOCUS-FORMING VIRUS.

(E.) Bennett, M. (Roswell Park Mem. Inst., Buffalo, N. Y.) R. A. Steeves, G. Cudkowicz, E. A. Mirand and L. B. Russell. Science 162(3853):564-565, 1968.

Susceptibility to the component of Friend leukemia virus complex initiating spleen focus formation (SFFV) was studied in congenic mice of strains C3H/He, C57BL/10 and (C3H x B10)F_1 with mutant alleles at the Steel locus (Sl; Sl^T indicates a translocation at the Sl locus). Mice of genotypes Sl/Sl^d, Sl/+ and Sl^d/+ were resistant to SFFV, but mice of genotypes Sl^T/Sl^T or Sl^T/+ were sensitive to SFFV. Mice of genotype +/+ were also sensitive to SSFV, especially before age 3 mo. The Sl locus apparently affected the environment of the SFFV target cells to the extent that they were either unable to form spleen foci when infected, or not available for infection. The same genes also seemed to affect hematopoiesis and leukemic transformation.

69-1026 TRANSPLANTATION IMMUNITY AND THE SUPPRESSION OF SPLEEN COLONY FORMATION BY IMMUNIZATION WITH MURINE LEUKEMIA VIRUS PREPARATIONS (FRIEND).

(E.) Friend, C. (Mt. Sinai Sch. Med., City U. New York) and G. B. Rossi. Int. J. Cancer 3(4):523-529, 1968.

Spleen colony formation and transplantation immunity were studied in several experiments in 6-10-wk.-old DBA/2 (male and female) and ICR/Ha Swiss (female) mice immunized by 3-wk. courses of tissue culture-grown or formalin-inactivated Friend leukemia virus (FLV) and challenged with FLV-induced leukemic cells (from established tissue culture lines) or with active FLV. The leukemic potential of FLV from the tissue culture system was low, but its immunizing capacity was equal to that of formalin-inactivated FLV from spleen filtrates. All preparations protected the mice against FLV challenge. The leukemic cells also markedly inhibited spleen colony formation in lethally irradiated, preimmunized mice, demonstrating transplantation immunity.

69-1027 CLONAL ANALYSIS OF FRIEND VIRAL LEUKEMIA CELLS IN VITRO. I. VIRUS PRODUCTION OF ISOLATED CLONAL SUBLINES.

(E.) Oboshi, S. (Nat. Cancer Ctr., Tokyo), T. Seido and M. Katagiri. Gann 59(5):377-386, 1968.

An attempt was made to isolate non-virus-producing cells from an established (170 in vitro passages) cell culture line of tumor cells from Friend virus (FLV)-induced leukemia. Strain ddN mice were used for the maintenance of FLV and for virus titration and assay; ddOM mice were used for transplantation of cultured leukemic cells. Single-cell clones were grown on irradiated mouse embryo feeder layers in the presence of anti-FLV serum from Donryu rats; the cloning efficiency was 59%. All of the 119 clonal sublines tested continued to produce FLV, but a 1000-fold difference in nfectivity titers was seen; results with 62/119 ublines were negative even with a 2-ml inoculum f culture fluid. The clones were resistant to hallenge infection with FLV of high infectivity.

69-1028 TRANSMISSION THROUGH MILK OF ANTIBODIES AGAINST THE FRIEND VIRUS IN MICE. (E.) Mathot, C. (Rockefeller U., New York, N. Y.) and . Scher. Nature (London) 219(5149):82-83, 1968.

Serum antibodies to Friend leukemia virus (FLV) were studied by immunoelectroadsorption in strain NCS (highly sensitive) or C57 (resistant) female mice inj. i.p. with FLV-infected spleen cells during pregnancy (10-11 days before term) and in their offspring. Serum antibody levels were high in the infected females (16 days after inoc. of infected spleen cells) and in the first litters of their normally born offspring, nursed by the infected mothers (examined 10 days after birth; designated as normal litter #1). Little or no antibody was noted in sera from the second litters of infected females (normally born and nursed by infected females), or in Caesarean-born, foster-nursed first litters of the infected females (designated as Caesarean litters). No strain differences were noted. The degree of splenomegaly in NCS mice of normal litter #1 at age 4 wk. was about the same as in 2-wk.-old NCS mice inj. with FLV at age 3 days and in NCS animals of the Caesarean litter, suggesting that FLV is transmitted through the placenta and the milk (at least in NCS mice; the C57 mice did not develop splenomegaly during this time), and that maternal antibodies afford little or no protection under these conditions.

69-1029 IMMUNOTHERAPY IN FRIEND VIRUS LEUKEMIA. I. PREVENTION OF FRIEND LEUKEMIA IN THE OFFSPRING OF IMMUNIZED MOTHERS. (E.) Wahren, B. (Karolinska Inst., Stockholm). J. Nat. Cancer Inst. 41(4):923-929, 1968.

Preconception immunization of female DBA/2 or (C3H/Bi x DBA/2)F_1 mice, using living cells of Friend leukemia virus (FLV)-induced DBA/2 leukemia, induced acquired resistance lasting at least 3 wk. in their offspring. This immunity decreased after age 6 wk. and was lost at age 10 wk., but reappeared at age 12-14 wk. The later immunity was apparently active, elicited by small amounts of maternally transmitted FLV; this was confirmed by results in the offspring of females immunized with formalin-inactivated FLV, which showed only the earlier resistance to FLV. Foster-nursing studies showed that the immunity was transmitted by the milk, from the first day of suckling. No immunity was seen in the offspring of heavily leukemic females. Studies of age and sex sensitivity to FLV in several strains of mice (DBA/2, (C3H/Bi x DBA/2)F_1 or D2C3) showed a higher sensitivity in females than in males (of the same strain) at all ages up to 10 wk., especially in the first 4 wk.; a natural resistance appeared after the first 3 wk.

69-1030 IMMUNOTHERAPY IN FRIEND VIRUS LEUKEMIA. II. PREVENTION OF FRIEND LEUKEMIA BY PASSIVE ADMINISTRATION OF IMMUNE SERUM AND CELLS TO YOUNG MICE. (E.) Wahren, B. (Karolinska Inst., Stockholm). J. Nat. Cancer Inst. 41(4): 931-938, 1968.

Several methods of inducing passive immunity to Friend leukemia virus (FLV)-induced leukemia were compared in C3H/Bi, DBA/2 and C57BL mice and their F_1 hybrids. Antisera produced by immunization of hybrid mice with living or formalin-inactivated FLV leukemic spleen cells (from DBA/2 mice) neutralized the virus and proved cytotoxic to FLV cells. These sera also protected newborn mice from leukemia induction, even when admin. 6 days after FLV; best results were seen in the offspring of immune mothers, inoc. at birth with the hyperimmune serum. Foster-nursing studies demonstrated cytotoxic antibodies in the sera of mice nursed by immunized females, but not in the offspring of immunized females nursed by untreated females. In the infected offspring, the spleen wt. was inversely related to the presence of cytotoxic antibodies in the mother's serum (which decreased during lactation). Max. protection afforded by immune lymph node cells was seen in mice immunized 7-14 days before FLV inoc. The protective effect of these humoral antibodies was specific; no cross-reaction with the Gross virus-induced leukemia antigen was noted.

69-1031 GROWTH CURVES OF RAUSCHER AND FRIEND MURINE LEUKEMIA VIRUSES IN JLS-V9 TISSUE CULTURE. (E.) Wright, B. S. (Chas. Pfizer Co., Inc., Maywood, N. J.), P. A. O'Brien, R. Stephens, H. Bielewicz and G. P. Shibley. Cancer Res. 28(8):1655-1658, 1968.

The growth patterns of Rauscher (RLV) and Friend (FLV) leukemia viruses in an established cell line (JLS-V9 mouse bone marrow cells) were very similar to the growth patterns of RLV in weanling BALB/c mice. Both RLV- and FLV-infected cultures showed rapid synthesis and progressive increases in extracellular virus particles (budding particles appeared after 3 and 5 days, resp., with max. titers after 7-10 days) and became leukemogenic for mice after 5 days or more of in vitro cultivation. The RLV-infected cells continued to produce virus particles and to release infectious virus in mice after 69 subcultures in vitro (the FLV-infected cells were not studied in this respect).

69-1032 STRUCTURE OF RAUSCHER MOUSE LEUKAEMIA VIRUS RNA. (E.) Blair, C. D. (U. California, Berkeley) and P. H. Duesberg. Nature (London) 220(5165):396-399, 1968.

The physical properties of ^{3}H-labeled RNA from Rauscher leukemia virus (RLV) and ^{32}P-labeled RNA from Rous sarcoma virus (RSV) and Newcastle disease virus (NDV) were compared by density gradient centrifugation analysis (before and after melting). Tobacco mosaic virus (TMV) RNA was used as a 31S sedimentation marker. Unmelted and melted RLV RNA sedimented predominantly at 63S and 54S, resp.; the 63S RNA of RLV was apparently an aggregate of smaller molecules, held together not by a single polynucleotide, but by weak physical bonds. The physical properties of RLV and RSV RNA's were similar to each other, and distinctly different from the properties of NDV, TMV and cellular RNA's. The estimated molecular wt. of the largest subunit of RLV RNA was 3 x 10^6. It could not be determined whether the disaggregated RNA from RLV represented RNA from infectious RLV particles. The disaggregation of both RSV and RLV RNA's, under conditions not affecting other viral or cellular RNA's, suggested an aggregate as the common structure of RNA from viruses of the avian leukosis-sarcoma and the mouse leukemia-lymphoma-sarcoma groups.

69-1033 DEMONSTRATION OF VIRAL RNA IN CELLS CHRONICALLY INFECTED BY RAUSCHER VIRUS. (Fr.) Hampe, A. (St. Louis Hosp., Paris), F. Galibert, L. Peraudeau and M. Boiron. C. R. Acad. Sci. [D] (Paris) 267(9):908-910, 1968.

In a sucrose density gradient, ^{3}H-labeled RNA from Rauscher leukemia virus (RLV) cosedimented with ^{32}P-labeled cytoplasmic RNA from a RLV-infected cell line (JLS V5). RNA from HeLa cells did not cosediment with RLV RNA. Since RLV RNA could not be extracted from actinomycin D (AD)-treated JLS V5 cells, it is suggested that AD inhibition of RLV RNA synthesis might result from a direct action on the complex formed by the replicating enzyme and the RLV genome to be copied, although the possibility of the involvement of DNA-dependent RNA in RLV formation could not be excluded.

69-1034 STUDY OF CLONES DERIVED FROM A CELL LINE CHRONICALLY INFECTED BY RAUSCHER VIRUS. (Fr.) Geraldes, A. (St. Louis Hosp., Paris), J. Peries, M. Thomas, C. Bernard and M. Boiron. Europ. J. Cancer 3(3):203-207, 1967.

The biological behavior (virus particle production, BALB/c mouse leukemogenic activity of the virus obtained, production of antiviral substances and induction of heterologous viral interference) of 8 clones of the JLS V5 cell line resembled the behavior of the parent cells, which seemed to confirm the hypothesis that the JLS V5 cell line represents a steady-state type of virus-cell interaction.

69-1035 ESTABLISHMENT OF ERYTHROBLASTIC CELL LINES FROM THE SPLEEN OF MICE WITH RAUSCHER LEUKEMIA. (E.) Miyoshi, I. (Okayama U. Med. Sch., Japan), T. Tsubota, S. Irino and K. Hiraki. Gann 59(5):439-441, 1968.

Two cell lines (designated OUMS-1 and OUMS-2) were established from spleen cells of BALB/c mice with Rauscher leukemia virus (RLV)-induced leukemia and carried in continuous in vitro passage for 5-7 mo. Both cell lines consisted of mixed fibroblastoid and round cells (resembling immature reticulum-like cells and erythroblasts in various stages of maturity). RLV particles (Type C) were produced by the OUMS-1 cells in the later in vitro passages, but the cells and particularly the culture fluids showed a marked decrease in leukemogenicity (in newborn AKR mice) after 1 mo. of in vitro cultivation.

69-1036 INTERFERON AND MURINE LEUKEMIA. V. EFFECT OF INTERFERON PREPARATIONS ON THE EVOLUTION OF RAUSCHER DISEASE IN MICE. (E.) Gresser, I. (Sci. Res. Inst. Cancer, Villejuif, France), L. Berman, G. De-Thé, D. Brouty-Boyé, J. Coppey and E. Falcoff. J. Nat. Cancer Inst. 41(2):505-522, 1968.

In 1-mo.-old BALB/c mice (both sexes) infected with Rauscher leukemia virus (RLV), continuous treatment with 10-fold conc. preparations of mouse brain interferon prolonged the mean survival time, delayed the development of symptoms and reduced the production of infectious virus particles, suggesting continued inhibition of the multiplication of RLV.

69-1037 INHIBITION OF VIRAL LEUKEMOGENESIS IN MICE BY TREATMENT WITH SYNTHETIC POLYNUCLEOTIDES. (Fr.) Youn, J. K. (Gustave-Roussy Inst., Villejuif/Seine, France), G. Barski and J. Huppert. C. R. Acad. Sci. [D] (Paris) 267(7):816-819, 1968.

The effects of a polyinosinic acid-polycytidylic acid preparation (PI:PC; 50 or 100 μg x 1 or 5 i.p.) on Rauscher leukemia virus (RLV) leukemogenesis were studied in female BALB/c mice (30-40 days old). A single inj. of PI:PC (100 μg) 2 hr. before RLV, or 5 doses of PI:PC (each 50 μg) beginning at the same time, significantly prolonged the av. survival times and protected some of the mice against the development of leukemia (4/15 and 6/15, resp., were alive and asymptomatic 90 days after RLV inoc.). This protective effect of PI:PC was attributed to the induction of interferon by this synthetic RNA polynucleotide in the earliest stages of RLV infection; no protection was afforded by the larger dose of PI:PC when treatment was delayed for 48 hr. after RLV inoc.

69-1038 FURTHER STUDIES ON THE ERYTHROCYTIC HOST RESPONSE IN MOLONEY MURINE LEUKEMIA. (E.) Vernick, S. H. (NCI, Bethesda, Md.), B. J. Lloyd, Jr., K. Perk and H. Sims. Cancer Res. 28(8):1631-1636, 1968.

ragiligraphic analysis of RBC from 8-wk.-old ALB/c mice with Moloney virus leukemia showed imodal curves representing 2 RBC populations; his observation was confirmed by electron icroscopic examination. Similar patterns were een in the RBC of 2-day-old mice without eukemia. Electron microscopic examination showed o association of the leukemia virus with the ature RBC from leukemic mice; the absence of etal-type RBC from the blood of normal 8-wk.-ld animals suggested that the virus induced he production of fetal-type RBC. Electrohoretic analysis revealed no fetal Hb in any of he samples. It is suggested that RBC from the smotically more resistant second populations in he leukemic mice were not fetal cells in the ense of containing fetal Hb, but rather more imilar to the fetal RBC that develop first in he fetal liver (from 12-at least 17 days of estation) and later in the bone marrow (after 6 days).

9-1039 IMMUNOLOGIC, VIROLOGIC, AND PATHOLOGIC STUDIES OF REGRESSION OF AUTOCHTHONOUS OLONEY SARCOMA VIRUS-INDUCED TUMORS IN MICE.

E.) Fefer, A. (NCI, Bethesda, Md.), J. L. cCoy, K. Perk and J. P. Glynn. *Cancer Res.* 8(8):1577-1585, 1968.

n adult BALB/c or C57BL/6 mice and their F_1 ybrids (both sexes), the regression of autochthonous Moloney sarcoma virus (MSV)-induced umors (which was not seen in newborn or preiously irradiated mice) was preceded, accompanied nd followed by the production of circulating ntibodies that neutralized the tumor-inducing roperties of MSV and induced resistance to yngeneic transplants of MSV-induced tumors. The SV content in regressing tumors was low in the late stages; in animals with non-regressing tumors, oncogenic MSV was noted in the plasma and spleen, tumor MSV production remained high, and no virus-neutralizing activity was found in the serum. Only regressing tumors were infiltrated with mononuclear cells. Evidence is presented suggesting that rejection of MSV-induced tumors is mediated by a cellular (not humoral) immune response.

69-1040 PRESENCE IN MURINE SARCOMA VIRUS STOCKS OF A THIRD COMPONENT WHICH ALONE INITIATES CELLULAR CONVERSION.

(E.) Boiron, M. (St. Louis Hosp, Paris) B. Guillemain, C. Bernard, J. Peries and J. C. Chuat. *Nature (London)* 219(5155):748-749, 1968.

In vitro titration curves of Moloney sarcoma virus (MSV; in Swiss mouse embryo cells) showed a 3-phase curve of focus-forming activity: a plateau at the lowest dilutions (indicating a number of foci varying proportionately with the dilution), followed by a downward slope (indicating a number of foci varying approx. as the square of the dilution), followed by another plateau. The first 2 curves suggested the interaction between MSV (a defective virus) and Moloney leukemia virus (MLV; its helper). The linear relationship seen at the higher dilutions suggested a third component which could induce cellular conversion (focus formation) without the aid of MLV. This component did not consist of MLV-MSV aggregates, because the same curve was obtained with preparations that had been filtered to remove such aggregates. The nature of this non-defective component is unknown, but several possibilities are suggested; the particles may represent a contaminant of the MSV stock, a non-defective MSV population, or an MSV-MLV recombinant.

69-1041 ENHANCING EFFECT ON TUMOUR GROWTH OF HUMORAL ANTIBODIES AGAINST TUMOUR SPECIFIC TRANSPLANTATION ANTIGENS IN TUMOURS INDUCED BY MURINE SARCOMA VIRUS (HARVEY).

(E.) Bubenik, J. (U. Parma, Italy) and A. Turano. *Nature (London)* 220(5170):928-930, 1968.

Tumor-specific transplantation antigens (TSTA) were present in 6/6 transplantable tumors induced by Harvey sarcoma virus (HSV) in C57Bl/6, A/L and C57Bl/10 Sn mice. An irradiated (12,000 r) homogenate of 1 of these tumors (MSVT$_{13}$; transplant generations 3-6; induced originally in a C57Bl/6 mouse) was used to induce 5 anti-TSTA sera in C57Bl/6 and C57Bl/10 Sn mice. All of these sera stimulated the growth of 6/6 small isografts of HSV-induced tumors; the tumors were from mice of different genotypes, but they were about equally sensitive to the antisera. The failure of mercaptoethanol to inhibit the tumor-enhancing effect of the antisera showed that the tumor-enhancing antibodies were of the 7S (rather than the 19S) type. Control antisera, prepared with normal mouse spleen + kidney homogenates with H-2 locus specificities, did not enhance tumor growth. Since none of the antisera induced tumors in newborn mice, they did not contain active HSV in detectable quantities.

69-1042 ALTERED PROPERTIES OF FUJINAMI-VIRUS-INFECTED DUCK CELLS AND MURINE SARCOMA VIRUS-INFECTED RAT CELLS.

(E.) Temin, H. M. (U. Wisconsin, Madison). *Int. J. Cancer* 3(4): 491-503, 1968.

Morphological and biochemical changes associated with transformation by RNA sarcoma viruses were studied in primary fibroblast cultures: duck embryo cells infected wtth the Fujinami virus, chick embryo cells infected with Rous sarcoma virus, and rat embryo cells infected with the Harvey mouse sarcoma virus. Alterations in cell shape (to round or fusiform cells), increased glycolysis in the absence of serum, and decreased requirements for serum for glycolysis and multiplication, were constant correlates of malignant transformation in these 3 systems.

69-1043 RELEASE OF VIRUS INFECTIOUS TO CHICKENS BY RBI RAT SARCOMA IN TISSUE CULTURE AND BY ITS ASCITES FORM INTO THE ASCITIC FLUID. (E.) Svec, J. (Oncol. Res. Inst., Bratislava, Czechoslovakia), E. Hlavay and F. Svec. J. Nat. Cancer Inst. 41(4):859-866, 1968.

The B77 variant of Rous sarcoma virus induced a sarcoma (designated RBI) in Sprague-Dawley rats. This tumor, after adaptation to tissue culture in the absence of avian cells, released into the medium a virus which induced wing-web sarcomas in 100% of 6-14-day-old chickens (White Leghorn) at a 1:2 dilution (if at least 10^4 cells/ml were present in the tissue culture). Ascites RBI sarcoma (in Sprague-Dawley rats) released infectious virus into the ascitic fluid (120-1280 ID_{50}/ml), which also induced tumors in chickens after wing-web inoc. The rat origin of the RBI ascites sarcoma was confirmed by chromosome analysis. The cells were hyperdiploid, with a 59-60-chromosome stemline and no marker chromosomes.

69-1044 TUMOR PRODUCTION IN ADULT MICE BY SYNGENEIC EMBRYONIC CULTURED CELLS CONTAINING THE INCOMPLETE ROUS VIRUS. (E.) Kryukova, I. N. (Gamaleya Inst. Epidem. Microb., USSR Acad Med. Sci., Moscow), I. B. Obuch and T. I. Biryulina. Nature (London) 219(5150): 174-176, 1968.

Tissue culture cells from embryonic Af mice, infected but not transformed by Rous sarcoma virus (RSV; Carr-Zilber strain), induced transplantable tumors in 41/64 adult Af mice. These mice were not hypersensitive to RSV or to the oncogenicity of RSV-transformed embryonic tissue cultures. The tumors continued to produce RSV during serial transplantation. Cross-reactions (including complement fixation) between sera and tumor atigens from these mice and sera and tumor antigens from hamsters with PV tumors were studied. All but 1 of the tumors induced in adult Af mice were oncogenic to mice and chicks only after inoc. of cell-containing homogenates, but cell-free extracts of 1 tumor were oncogenic after transplantation from chicks to mice or from mice to chicks, though not after transplantation from 1 mouse to another. The altered oncogenic capacity (in adult and suckling mice) of RSV isolated from mouse tumors was apparently associated with a change in the viral genome (selection of a variant population during cultivation in embryonic Af mouse cells is suggested), rather than a change in the viral coat. It is also suggested that incomplete RSV may be more oncogenic to mice than infectious RSV.

69-1045 AGGLUTINATING ANTIBODIES IN THE SERA OF CHICKENS WITH REGRESSING ROUS SARCOMAS. (E.) Radzichovskaja, R. (Inst. Exp. Clin Oncol., Acad. Med. Sci. USSR, Moscow). Nature (London) 219(5152):407-408, 1968.

Agglutinating antibodies against the surface cell antigens of Rous sarcoma virus (RSV; Carr-Zilber strain)-induced chicken sarcomas were detected in 9/13 sera from chicksns with regressing tumors (induced by RSV or inoc. of RSV-containing tumor cells), but sera from birds without tumors, birds with actively growing tumors and birds rejecting skin homografts were negative in this respect. These antitumor antibodies could not be induced by immunization of the chickens with RBC or tissue suspensions from non-tumor-bearing birds. Since the antitumor antibodies also agglutinated normal cells, at least some of them were isoantibodies. Absorption of the immune sera with tumor cells eliminated the tumor cell agglutinating activity of the sera, but absorption with normal cells did not, suggesting the presence in RSV-induced tumor cells of a specific new antigen, in addition to the isoantigens of normal cells. The agglutinating tumor cell antigens could not be separated into cellular and viral antigens, because the tumor cells used contained RSV.

69-1046 PATHOGENESIS OF ROUS SARCOMA VIRUS IN THE CHICK EMBRYO WITH PARTICULAR REFERENCE TO VASCULAR LESIONS. (E.) Coates, H. (Johns Hopkins U., Baltimore, Md.), T. Borsos, M. Foard and F. B. Bang. Int. J. Cancer 3(4): 424-439, 1968.

Rous sarcoma virus (RSV) grew on the chick embryo chorioallantoic membrane when inoc. at any time during the embryonic period with some decrease in the growth when inoc. at the end of the period. The embryos were most susceptible to RSV when inoc. on days 11-13. The largest number of vascular pocks was seen in embryos inoc. on days 7-8; the decrease in vascular lesions seen in embryos inoc. on day 13 was accompanied by a decrease in RSV antibodies in the yolk, but antibody levels remained high despite the decrease in vascular pocks in embryos inoc. on day 11 of development. The vascular lesions were predominantly localized tumors of the vascular endothelium and from the early stages of pock development, contained periodic acid-Schiff-positive material. RSV growth in the embryonic liver (after i.v. inoc.) was seen throughout the developmental period, especially in embryos inoc. on days 8-10 of development; RSV was probably localized in the first few days, but viremia was irregularly demonstrable 3 days or more after i.v. inoc. of RSV.

69-1047 OBSERVATIONS ON THE NATURE OF A GENETIC CELLULAR RESISTANCE TO AVIAN TUMOR VIRUSES. (E.) Crittenden, L. B. (U.S. Dept. Agric., East Lansing, Mich.). J. Nat. Cancer Inst. 41(1):145-153, 1968.

Resistance to 2 pseudotypes (representing subgroups A and B) of the Bryan high-titer strain (RAV-1) of Rous sarcoma virus (RSV) was studied in fibroblast cultures from 10-day chick embryos of phenotypes C/O (susceptible to both RAV-1 subgroups), C/A (resistant to A, susceptible to B), C/B (resistant to B, susceptible to A) and C/AB (resistant to both subgroups) and in cells from Coturnix quail embryos; in all of these avian strains, the incidence of congenital avian leukosis was less than 3%. The high (perhaps complete) genetic resistance of C/A and C/AB cells to RAV-1 subgroup A virus was not accompanied by a decrease in RSV adsorption (by comparison with susceptible cells). Both C/A and C/AB cells synthesized RAV-1 after cocultivation with lethally irradiated (5000 r) RAV-1-producing susceptible cells, suggesting that the genetically controlled resistance to RSV transformation apparently occurred at the level of penetration or uncoating, without affecting the cells' ability to synthesize the excluded virus if its genome had entered the cells. Possible mechanisms governing the penetration of the RSV genome into resistant cells cocultivated with irradiated virus-producing cells are discussed.

69-1048 GLYCOLYSIS IN CHICK EMBRYO CELL CULTURES TRANSFORMED BY ROUS SARCOMA VIRUS. (E.) Steck, T. L. (NCI, Bethesda, Md.), S. Kaufman and J. P. Bader. *Cancer Res.* 28(8): 1611-1619, 1968.

In chick embryo cell cultures (second or later passages) transformed by the Bryan high-titer strain (RAV-1) of Rous sarcoma virus (RSV), lactic acid production under optimum growth conditions was about the same as in uninfected control cultures. Under growth-limiting conditions (contact inhibition, serum depletion, thymidine block, cultivation in liquid suspension medium), glycolysis declined as the cell population increased, but this decrease in glycolysis (lactate production and protein accretion) was more pronounced in the control cultures than in RSV-transformed cells. This difference usually appeared within 2 days of RSV infection. DNA synthesis (measured by ^{3}H-thymidine incorporation) was parallel with lactate production, but the patterns of RNA and protein synthesis showed less characteristic changes than the patterns of DNA synthesis and glycolysis. It is concluded that RSV transformation of chick embryo cells enhances their capacities for growth, and that increased glycolytic rates appear only as this differential growth potential is expressed.

69-1049 CHARACTERISTIC AND SELECTIVE AGGREGATE-FORMING ACTIVITY OF NEOPLASTIC CELLS IN CULTURE. (E.) Kuroda, Y. (Nat. Inst. Genetics, Mishima, Japan). *Gann* 59(4):281-288, 1968.

Dissociated Rous sarcoma virus-infected chick embryo cells and cells from a spontaneous mammary tumor from dd$_I$ mice, suspended in rotation cultures, formed larger aggregates than corresponding normal cells (uninfected chick embryo cells or normal dd$_I$ mouse mammary gland). HeLa cells (human cervical carcinoma), suspended in rotation cultures together with a variety of normal cells from chick embryos, selectively aggregated with skin epidermal and liver cells, but formed chimeric aggregates (HeLa and Chick) when mixed with embryonic skin dermal cells and limb bud mesoblasts, suggesting 2 possibilities for the origin of HeLa cells (from mesodermal tissue of the human cervix, the cells maintaining their original selectivity; or from non-mesodermal tissues undergoing alteration of their original selectivity during malignant transformation and/or prolonged *in vitro* cultivation).

69-1050 STUDIES ON IMMUNOGLOBULINS REACTIVE WITH TUMOR CELLS AND ANTIGENS. (E.) Sigel, M. M. (U. Miami Sch. Med., Fla.) and R. A. Fugmann. *Cancer Res.* 28(7):1457-1459, 1968.

The Spafas strain of chickens, without serum antibodies to Rous sarcoma virus (RSV-RAV1), was about 10-fold more susceptible to RSV tumor induction than a conventional outbred strain with serum antibodies (Kimber 137). The RSV antibodies present in the embryonic yolk and the sera of newly hatched chicks (conventional strain) were associated exclusively with the IgG fraction (7S type). Sera from 2 non-immunized sharks of different species (*Negaprion brevirostris* and *Gynglymostoma cirratum*) showed a large array of serologic activities, including a protective effect against RSV tumor induction in chickens (even when serum was admin. some time after RSV inoc. and inj. at a different site). The protective effect of shark serum was even greater in hamsters with transplanted adenovirus-induced tumors; admin. of shark serum 14 days after tumor cell inoc. (10^5 cells) reduced the tumor incidence from 100% (at about 60 days) to 0%. All shark serum antibodies were associated exclusively with the highly cytolytic IgM (19S) antibodies. The protective capacity of shark serum was destroyed by heat and therefore was associated with active complement (C'); the inertness of the hamsters' C' was attributed to incompatibility of shark antibody and mammalian C'1.

69-1051 THE *IN VIVO* LIFE SPAN OF NORMAL AND PRENEOPLASTIC MOUSE MAMMARY GLANDS: A SERIAL TRANSPLANTATION STUDY. (E.) Daniel, C. W. (U. California, Santa Cruz), K. B. DeOme, J. T. Young, P. B. Blair and L. J. Faulkin, Jr. *Proc. Nat. Acad. Sci. USA* 61(1):53-60, 1968.

The aging of normal and premalignant mammary glands was studied in female C3H, Balb/c and C57Bl mice with serial mammary gland isotransplants (transplanted into the mammary fat pads at age 3 wk.). Grafts of normal tissue aged during serial transplantation (as shown by a decline in the growth rate); 4/5 grafts were lost after 4-6 passages (6-12 mo.), and 1/2 of the rapidly growing grafts (from a Balb/c mouse) was lost after 7 passages (2 yr.). Since 1 of these normal tissue grafts was from a mouse of the mammary tumor virus (MTV)-positive, high-mammary nodule (MN) C3H strain, but showed approx. the same behavior as tissue grafts from the MTV-free, low-MN Balb/c and C57Bl strains (except for a faster growth rate; it was lost after 6 transplants), MTV infection itself did not affect the aging of normal mammary glands under these conditions. Normal tissue grafts from virgin and parous females showed about the same growth patterns, suggesting that the hormones of pregnancy and lactation did not stimulate normal mammary gland growth during unlimited transfer generations. Two rapidly growing premalignant mammary tissue grafts from C3H mice, however, showed no signs of aging during serial transplantation and were still actively growing after 32-34 passages (8-8.5 yr.). It is concluded that the in vivo proliferative capacity of the normal mammary gland is limited, but that premalignant mammary tissue (like malignant mammary tumors) has an apparently unlimited life span under similar conditions.

69-1052 DENSITY GRADIENT CENTRIFUGATION OF RED BLOOD CELLS CARRYING THE MAMMARY TUMOUR VIRUS. (E.) Ritter, R. I. (U. California, Berkeley) and S. Nandi. Nature (London) 220(5165):403-404, 1968.

The presence of mammary tumor virus (MTV) in peripheral RBC populations of different ages (separated by density gradient centrifugation in bovine serum albumin) was studied by the mammary nodule bioassay method in female BALB/c mice with pituitary isografts, inj. i.p. with RBC from MTV-positive female donors of 2 strains: naturally infected BALB/cfC3H/Crgl mice in 1 experiment (measuring the effects of the donors' ages) and in another experiment (studying the effects of the duration of MTV infection), BALB/cCrgl mice (MTV-free strain) previously inj. with hemolyzed RBC from MTV-positive BALB/cfC3H mice. The pellets at the bottom of the centrifugation tubes had no MTV activity. Results in both groups showed a delay of several days before MTV appeared in the peripheral RBC, and preferential localization of MTV in the RBC fraction of lowest specific gravity (presumably the immature RBC), suggesting that MTV infected a population of erythropoietic cells (which were released into the circulating blood upon maturation), without being adsorbed on mature peripheral RBC. Decreased MTV activities in the mature RBC population (with high specific gravity) suggested either a loss of viral nucleic acid with RBC aging (analogous to the RNA loss in mature RBC), or a decreased life span of MTV-infected RBC.

69-1053 RESISTANCE TO SMALL AMOUNTS OF BITTNER MAMMARY TUMOR VIRUS IN OFFSPRING OF C57BL FEMALE MICE WITH THE VIRUS. (E.) Bentvelzen, P. (NCI, Bethesda, Md.). J. Nat. Cancer Inst. 41(3):757-765, 1968.

Several hybridization and foster-nursing experiments were performed in female mice of 1 mammary tumor virus (MTV; Bittner virus)-positive strain (BALB/cfC3H) and hybrid mice of the MTV-free C57BL and BALB/c strains. The mice of MTV-free hybrid strains were implanted with diethylstilbestrol pellets (which induced mammary tumors in about 8% at an av. age of 2 yr.). C57BL females carrying tumor-inducing levels of MTV (introduced by foster-nursing) did not transmit oncogenic quantities of MTV to their (C57BL x BALB/c)F_1 offspring; MTV resistance in the offspring was attributed to transmission of neutralizing antibodies. MTV was transmitted to the (C57BL x BALB/c)F_1 offspring of MTV-positive C57BL females by foster-nursing on BALB/cfC3H mice, but not by foster-nursing on MTV-positive C57BL females, indicating poor transmission of MTV by C57BL females. Other experiments in mice foster-nursed on MTV-positive females on day 1 or day 3 of life demonstrated transmission of threshold doses of MTV on the first day of life. Genetic control of the immune response of C57BL mice to MTV is discussed.

69-1054 ONCOGENESIS AND POLIOMYELITIS VACCINE. (E.) Innis, M. D. (Princess Alexandra Hosp., Brisbane, Australia). Nature (London) 219(5157):972-973, 1968.

Immunization histories were evaluable in 816/903 children with leukemia admitted to 1 hospital in Brisbane (216/253 pts.; Brisbane Children's Hospital) and 1 hospital in Sydney (600/650 pts.; Royal Alexandra Hospital) from January, 1958 through May, 1967. The immunization histories of these children and 816 others of the same sex and approx. age (without leukemia) were compared. Parenteral polio vaccine had been admin. to 29/110 children under 1 yr. with leukemia and to 28/110 controls. This difference was not significant, but the difference between leukemic and control children over 1 yr. old (618/706 and 519/706, resp., had received parenteral polio vaccine) was highly significant. Other histories of immunization (diphtheria, pertussis and tetanus in both age groups; BCG, smallpox, typhoid and cholera in the older children) were about the same in leukemic and control children. Contamination by SV40 of the monkey kidney cells used in the production of polio vaccine is suggested.

69-1055 VIROLOGIC STUDIES IN HUMAN LEUKEMIA AND LYMPHOMA: THE HERPES-TYPE VIRUS. (E.) Rauscher, F. J., Jr. (NCI, Bethesda, Md.). Cancer Res. 28(7):1311-1318, 1968.

Electron microscopic examination showed particles of herpes-type virus(es) (HTV) in 61/204 cell lines (30%) from 44/105 pts. (42%) with lymphoma (23/41 cell lines, 19/31 pts.), lymphatic leukemia (4/17 cell lines, 4/15 pts.), myeloid leukemia (23/100 cell lines, 14/34 pts.) and carcinoma or sarcoma (11/46 cell lines, 7/25 pts.). HTV was also detected in 5/25 cell lines from 3/14 normal subjects and 1/5 pts. with nonmalignant disease. HTV-positive cell lines were obtained from cancer pts. and control subjects from many parts of the world (U.S., England, Africa, Australia, New Guinea, Sweden and Japan). Cell-free extracts containing HTV induced a progressive encephalitic syndrome after intracerebral inoc. in hamsters and newborn kittens, but no virus particles were noted in thin sections of neural tissue. Only HTV was isolated from American pts. with leukemia or Burkitt-type lymphoma, but several other viruses (notably reovirus) were isolated from African pts. with Burkitt lymphoma.

60-1056 IMMUNOCHEMICAL AND MORPHOLOGIC COMPARISON OF DONOR TISSUES WITH IMMUNOGLOBULIN-PRODUCING TISSUE CULTURE LINES FROM TWO PATIENTS WITH MALIGNANCIES. (E.) Finegold, I. (NCI, Bethesda, Md.), Y. Hirshaut and J. L. Fahey. Cancer Res. 28(8):1538-1549, 1968.

Cell line LI-1, from a pt. with acute myeloid leukemia, consisted of large primitive cells not resembling the donor's myeloblasts. Cell line IM-1, from a pt. with lymphoblastic lymphoma of mixed type (plasma and lymphoid cells), consisted of similar primitive cells, lymphocytes and a few macrophages. Both cell lines produced IgG types kappa and lambda and IM-1 also produced kappa light polypeptide chains. No immunoglobulins of these types were detected in the sera or the normal or malignant cells of either of the donors. It is concluded that designation of these cell lines (maintained in vitro for 10-18 mo.) as leukemia cell lines would be inappropriate until the relationship between the cells in culture and the normal and malignant cells of the donors is studied further.

69-1057 HUMAN LYMPHOBLASTOID LINES FROM LYMPH NODE AND SPLEEN. (E.) Levy, J. A. M. Virolainen and V. Defendi (Wistar Inst., Philadelphia, Pa.). Cancer 22(3):517-524, 1968.

Two continuous cell lines, designated WI-L1 and WI-L2, were obtained from lymph node and spleen cells of 2 pts. without clinical signs of malignant disease at the time of biopsy. The WI-L1 cells were obtained from a lymph node biopsy from a man who developed clinical signs of mycosis fungoides 2 mo. later; the WI-L2 cells were obtained from a splenectomy specimen from a child with hereditary spherocytic anemia. Attempts to obtain continuous cell lines from lymph node biopsy specimens of 26 other pts. with malignant or untreated diseases were unsuccessful. Both donors of successful cell lines had histories of viral disease, but the role of the viral infections in the establishment of these lines could not be determined. Both cell lines were morphologically similar to cells derived from pts. with leukemia or the Burkitt lymphoma; cell line WI-L1 contained a herpes virus-like particle, but the donor of this cell line had a history of herpes zoster 1.5 yr. before the biopsy was obtained.

69-1058 MORPHOLOGY OF CULTURED HEMATOPOIETIC CELLS. (E.) Moore, G. E. (Roswell Park. Mem. Inst., Buffalo, N. Y.), H. Kitamura and S. Toshima. Cancer 22(2):245-267, 1968.

In a summary of the authors' studies and previously published reports (81 references), it is concluded that cultured lymphoblastoid cell lines from normal subjects cannot be distinguished morphologically from phytomitogen-stimulated lymphoblasts or cell lines derived from pts. with leukemia, Burkitt's lymphoma and infectious mononucleosis. A majority of these cell lines, irrespective of origin, produced herpes-type "leukovirus" particles; all of the cell lines tested (over 100) produced immunoglobulins or immunoglobulin fragments. None of the authors' cell lines contained fibroblasts; cell types seen included stem cells, lymphoblasts, lymphocytes, plasmablasts and macrophages. No erythroblastic cells or granulocytes were seen in long-term cultures (some of which were maintained for several yr.). Most of the cell lines retained their normal karyotypes.

69-1059 ELECTRON-MICROSCOPIC SEARCH FOR VIRUS PARTICLES IN PATIENTS WITH LEUKEMIA AND LYMPHOMA. (E.) Seman, G. (Brousse Hosp., Villejuif, France) and C. Seman. Cancer 22(5): 1033-1045, 1968.

Virus-like particles (VLP), resembling mouse leukemia virus Type A particles, were seen in blood cells from 25/66 pts. with leukemia (9/44 acute, 6/22 chronic) and 0/14 with lymphoma (including Hodgkin's disease). Best results were seen with thin sections of buffy coat cells. VLP were seen in plasma from 12/79 pts. (14%) with acute or chronic leukemia (6/31 and 2/19, resp.) and lymphoma (4/29). Both blood cells and plasma were positive in 6/34, all with leukemia (4/12 acute, 2/2 chronic lymphatic). VLP were seen in 12/24 biopsy specimens: 14/16 lymph node specimens from lymphoma pts. (3/4 lymphosarcoma, 3/4 reticulum cell sarcoma, 4/8 Hodgkin's disease) and 2/2 bone marrow specimens from acute leukemia; 6 spleen specimens were negative. Biopsy specimens from 2/2 with breast carcinoma also showed VLP; specimens from 4 other pts. with cancer (2 unspecified carcinomas, 1 adenoma, 1 melanoma) and 25 others without cancer (including 19 blood donors) were negative.

69-1060 GROWTH IN VITRO OF HERPES SIMPLEX VIRUS IN HUMAN LYMPHOMA CELL LINES. (E.) Bedoya, V. (NCI, Bethesda, Md.), A. S. Rabson and P. M. Grimley. J. Nat. Cancer Inst. 41(3):635-652, 1968.

The growth of herpes simplex virus (HSV) was studied in the AL1 and AL3 cell lines from

African or American children with Burkitt lymphoma (1-3% of the cells released herpes-type virus (EB) particles shortly after establishment of the in vitro line, but virus production thereafter was rare or absent). Light and electron microscopic examination showed that the course of HSV infection in these cells was qualitatively similar to the effects of herpes-type virus (EB) infection in early subcultures of these cells, although the course of HSV infection was more severe. Intranuclear inclusions (Cowdry Type A) and later disruption of the nuclear membranes (releasing immature virus particles and associated chromatin into the cytoplasm) were seen in both cases. HSV-infected and uninfected lymphoma cells both showed a reticular network associated with the endoplasmic reticulum or annulate lamellae.

69-1061 HUMAN OSTEOSARCOMAS: IMMUNOLOGIC EVIDENCE SUGGESTING AN ASSOCIATED INFECTIOUS AGENT. (E.) Morton, D. L. (NIH, Bethesda, Md.) and R. A. Malmgren. Science 162(3859):1279-1281, 1968.

Fluorescent antibodies against 4 human osteogenic sarcomas were detected in 13/13 sera from the 4 pts., 34/40 sera (85%) from 14 members of their immediate families, 11/12 sera (91%) from 4 close associates of 1 of the pts. with osteogenic sarcoma, and 20/70 sera (29%) from normal blood donors; titers of 1:600 were seen in 3/9, 1/21, 2/9 and 0/48 sera examined, resp. The distribution of these antibodies (detected by indirect immunofluorescence) suggested an infectious agent associated with osteogenic sarcoma, capable of producing unrecognized infections in healthy contacts of the pts.

69-1062 A COMPARATIVE STUDY OF CHILDHOOD RHABDOMYOSARCOMA AND VIRUS-INDUCED RHABDOMYOSARCOMA IN MICE. (E.) Freeman, A. I. (U. Tennessee, Memphis), and W. W. Johnson. Cancer Res. 28(8):1490-1500, 1968.

By light and electron microscopy and immunofluorescence (for myosin), 9 pathological specimens of rhabdomyosarcoma from 6 children were similar to 12-day-old rhabdomyosarcomas induced by Moloney sarcoma virus (MSV) in newborn BALB/c mice. The ultrastructure of the human tumor was distinctive enough to make electron microscopy an important diagnostic precedure for rhabdomyosarcoma. No virus particles were seen in the human tumor; but 1 specimen contained electron-dense particles believed to be fragments of rough endoplasmic reticulum. The mouse tumor contained particles typical of MSV and mouse leukemia.

69-1063 EXPERIMENTAL AEROSOL TRANSMISSION OF YABA VIRUS IN MONKEYS. (E.) Wolfe, L. G. (Ohio State U., Columbus), R. A. Griesemer and R. L. Farrell. J. Nat. Cancer Inst. 41(5): 1175-1195, 1968.

Aerosol admin. of Yaba virus (YV) induced tumors in 5/12 rhesus and 1/3 cynomolgus monkeys; 1 animal developed self-limiting s.c. and nasal tumors and 5 others (including 1 animal inoc. in the neonatal period) developed single or multiple lung tumors. No tumors developed in 1 monkey maintained under germfree conditions prior to YV admin. YV also induced tumors of various sites (including skeletal muscle, nasal cavity and s.c. tissues) in 6/6 animals inoc. s.c., i.v., intrathoracically or into the lungs. Individual susceptibility to aerosol YV was not correlated with the duration of infection (the 5 animals with lung tumors were sacrificed 2-16 wk. after YV exposure) or with the estimated dose of YV retained in the lungs (8.6×10^3-1×10^5 FFU). YV was isolated in large quantities from macroscopically normal lung tissue next to the lung tumors of 2 animals, but not from lung tissues more distant from the tumors, or from normal tissues of other animals sacrificed after 2-16 wk. YV was isolated from nasal samples, but not from the blood, of the animal with the nasal tumor. Horizontal transmission to cagemates was not observed. The lung and nasal tumors were morphologically similar to YV-induced s.c. tumors (histiocytomas). It is concluded that aerosolized YV is potentially hazardous to man.

69-1064 IMMUNOLOGIC RESPONSE OF MONKEYS TO AEROSOLS OF YABA VIRUS. (E.) Wolfe, L. G. (Ohio State U., Columbus), A. Adler and R. A. Griesemer. J. Nat. Cancer Inst. 41(5): 1197-1203, 1968.

Complement-fixing (CF) and neutralizing antibody responses to Yaba virus (YV) were determined in 20 monkeys, 1-14 wk. after exposure to YV by aerosol (16) or s.c. inoc. (4). CF antibodies were demonstrated in sera from 3/4 of the s.c. inoc. and 5/6 of the aerosol-treated monkeys that developed tumors. In the s.c. treated monkeys, CF antibodies appeared at about the same time as s.c. tumors developed (after about 7 days), although no CF antibodies were seen after 21 days in 1 monkey developing s.c. tumors after 10 days. Neutralizing antibody titers parallelled the CF titers in tumor-bearing animals. No antibodies were detected in YV-treated monkeys without tumors or in their untreated cagemates. CF antibody titers detected with extracts of s.c. and lung tumors (as CF antigens) were comparable, but CF titers detected with infected cell culture preparations as antigens were consistently lower. One animal developed multiple s.c. tumors despite high serum neutralizing antibody titers. Immunofluorescence demonstrated YV antigen in lung tumor cells; the fluorescent foci corresponded to the inclusion bodies seen under the light and electron microscope.

See also abstract nos.: 899,900,901,902,903,908,916,931,1105,1120,1121

-1065 CANCER IN THE NATAL AFRICAN, 1964-66.
CANCER MORBIDITY INCIDENCE AND GEO-
APHICAL PATHOLOGY IN THE NATAL HINTERLAND.
.) Schonland, M. (U. Natal, Durban, South
rica) and E. Bradshaw. S. Afr. J. Med. Sci.
(2):33-42, 1968.

ncer morbidity rates from 1964-1966 were studied
the African population (predominantly Zulus)
2 urban (Durban and Pietermaritzburg) and 4
ral areas of Natal. Of the 3174 new cancer
ses seen in the hinterlands, 1673 were in males
d 1501 in females (standardized morbidity 57.7
d 45.8, resp.). Crude cancer morbidity rates
r the Natal hinterlands were about 50% of the
tes in Durban (139.0 in males, 120.7 in females)
d Pietermaritzburg (128.7 and 105.8, resp.);
is was attributed to the limited diagnostic and
erapeutic services for Africans living in the
interlands, particularly in the remote reserva-
ion districts. In general, the districts
ssociated with opportunities for cash wage earn-
gs in the towns showed a relatively high inci-
ence of lung and esophagus cancer (attributed to
igarette smoking and alcohol consumption) and a
ecreased incidence of cervix cancer (attributed
better hygienic standards and socioeconomic
nditions). Cancer of the cervix and skin
excluding Kaposi's sarcoma), musculoskeletal
umors, leukemia and lymphoma were more frequent
n the remote districts where living conditions
ere poor, the av. socioeconomic status was low
nd water was very scarce. Variations in the
ancer incidence among the subdivisions of the
atal hinterland were attributed to differences
n available diagnostic services.

9-1066 PHYSIOGNOMY OF CANCER IN SOUTH VIETNAM.
SURVEY OF 10 YEARS OF ACTIVITY AT THE
ISTOPATHOLOGY LABORATORY OF THE GRALL HOSPITAL.
Fr.) Gayraud, J. (Army Hosp., Saigon). Med.
rop. (Marseille) 28(4):511-520, 1968.

10-yr. survey (1957-67) of pathological specimens
rom the Grall Hospital, Saigon (serving an urban
opulation of relatively high socioeconomic status)
howed malignant tumors in 1098/4398, including
18 males (45.1%) and 504 females (54.8%); 925/1098
ere Vietnamese. The incidence rose steadily with
ge in females, but fell in males until age 30;
he peak age in both sexes was 51-60. This de-
rease with age in males was partially attributed
o a decreasing incidence of lymphatic and hemato-
oietic tumors in males under 30 (total 8%; 5.1%
n males, 1.1% in females). Other partial explan-
ations for the sex difference in cancer incidence
ere the high proportion of female genital tumors
(28% of the entire group, 51% of the women; 93.3%
of these were cervix carcinomas) and the signifi-
cant sex difference in the sarcoma:epithelial
tumor ratio (1:4.8 in males, 1:11.3 in females),
articularly in the younger males. Comparisons
of these data with a report of 1411 cancer cases
from the Saigon Pasteur Institute (serving all of South Vietnam) published in 1957, showed several differences between the 2 groups: a decrease in oropharyngeal cancer from 22% in 1957 (33.7% in males, 17.7% in females) to 13% (16.9% and 9.8%, resp.); an increase in g.i. and peritoneal tumors from 6.5% (9.7% and 4.2%, resp.) to 23% (20.1% and 17.9%, resp.); a reduction in male genital tumors (13.7% to 6.2%; 12.2% to 1.6% in penis cancer); and an increase in respiratory cancer from 0.7% (2.3% in males, 0.1% in females) to 7.3% (14.1% and 1.7%, resp.). The respiratory cancer incidence in the author's group of Chinese and white pts. was 25.6% and 29.1%, resp., in males and 1.7% and 0/19, resp., in females. Eye, CNS and endocrine tumors were relatively rare (1.2% in the author's group). Data on skin tumors were incomplete (the Grall Hospital has no dermatology service), but the basal cell:spinal cell carcinoma ratio in the Vietnamese pts. (0.4) was intermediate between the values for white and Negro pts. (high and very low, resp.).

69-1067 GLIAL INDEX AND OCCURRENCE OF GLIAL TUMORS IN THE CEREBRAL CORTEX IN MAN. (Pol.) Szydłowska, H. (PAN Lab. Neurosurg. Path., Cracow, Poland). Neuropat. Pol. 6(1):43-60, 1968.

A strong mathematical relationship (with a positive correlation coefficient) was found between the glial index (number of glial cells/number of nerve cells) in the frontal, temporal, parietal and occipital lobes, insula, cingulate gyrus and sensory motor region of 5 normal adult brains and the mean annual number of glial tumors (not stated) involving these areas of the brain obtained from autopsy or surgery material at the Neurosurgical Clinic (Cracow) between 1956-1965, suggesting that the possibility of glioma development increases with an increasing glial index. Analysis of the relationship between the mean number of nerve cells and the mean annual number of gliomas in different areas of the cortex revealed a negative correlation coefficient. It is concluded that the frequency of gliomas and the number of nerve cells are mathematically more closely related than frequency of gliomas and the number of glial cells.

66-1068 A MALIGNANCY INVOLVING THE CRANIAL NERVES WITH A POSSIBLE GEOGRAPHIC DISTRIBUTION. (E.) Mardjono, M. (U. Indonesia Med. Sch., Djakarta), S. Supeno and S. Markam. Proc. Aust. Ass. Neurol. 5(Part 2):417-420, 1968.

Epidermoid carcinoma of the nasopharynx with cranial nerve involvement (particularly nerves 5 through 8) was seen in 30 male and 10 female pts. (age 10-over 50; most in the 30-45 age group) admitted in 1965-1966. These pts. represented 4% of all admissions and about 50% of all intracranial tumors seen at the University of Indonesia

Medical School during this time. Most pts. were from Java and Sumatra and some came from other islands in hte Indonesian group (Bangka, Billiton, Kalimantan, Sulawesi); 32 were Indonesians and 8 were Chinese. Possible contributory factors (discussed briefly) included chronic inflammation and irritation from opium and cigarette smoking. Since all of these pts. came from the lower socioeconomic groups, it is suggested that the smoke of wood and kerosene lamps used in small homes with poor ventilation might be another irritating factor. Analysis of these data and previously published reports suggested that nasopharyngeal cancer in Southeast Asia is not necessarily a disease primarily of the Chinese, but rather of the populations of the areas surrounding the South China Sea and the Java Sea.

69-1069 SOME EPIDEMIOLOGIC ASPECTS OF NEOPLASTIC DISEASES IN ISRAELI IMMIGRANT POPULATION. III. BRAIN TUMORS. (E.) Cohen, A. and B. Modan (Tel Hashomer Gov. Hosp., Israel). Cancer 22(6):1323-1328, 1968.

From 1960-1964, 918 new cases of brain tumors were seen in Israeli residents (excluding pts. with craniopharyngioma or tumors of the spinal cord or pituitary). The mean annual incidence/100,000 population in the 741 evaluable pts. was 7.3: 3.7 for malignant tumors (4.3 in males, 3.1 in females) and 2.4 for benign tumors (1.8 in males, 3.0 in females); the male:female ratios were 1.4:1 and 0.6:1, resp. Malignant tumors predominated in males at all ages under 70; in females, benign tumors were in a relative excess in pts. under 30 and over 70, reflecting a bimodal but not significant distribution of the meningiomas. Of the 376 malignant tumors, 40% were classified as glioblastoma multiforme and 25% as astrocytoma, both with a steadily increasing incidence with age; the incidence of ependymomas fell from 20% at age 0-14 to 3% at age 45+. The age incidence increased sharply at age 40-49 and peaked at age 60-69. Most of the 244 pts. with benign tumors (72% were meningiomas and 15% were acoustic neurinomas) were over 30. The age-specific incidence of malignant tumors was significantly higher in the European- and Israeli-born (5.5 and 4.5, resp.) than in the African- and Asian-born (2.7 and 2.8, resp.); in the pts. with benign tumors, the incidence in the European-born was slightly increased. This group of 741 evaluable pts. did not include 59 Arabs (excluded from the group because of a lower reporting and reliability rate in Israeli Arabs). The reasons for the higher incidence of brain tumors in Israel than in other nations could not be determined; for example, the data were not in accordance with the hypothesis that scalp X-irradiation against ringworm in immigrant children might increase the brain tumor incidence.

69-1070 TUMOURS OF THE ENDOCRINE GLANDS IN CATTLE, SHEEP AND PIGS FOUND IN A BRITISH ABATTOIR SURVEY. (E.) Sandison, A. T. (U. Glasgow, Scotland) and L. J. Anderson. J. Comp. Path. 78(4):435-444, 1968.

A 12-mo. survey (1965-1966) of suspected tumor specimens from 100 abattoirs throughout Britain (accounting for about 33% of the animals slaughtered in this period) showed a tumor incidence of 302/1.3 million in cattle, 107/4.5 million in sheep and 139/3.7 million in swine (the brains were not examined). Endocrine tumors (excluding the ovary and pituitary) comprised 3/139 swine, 3/107 sheep and 35/302 bovine tumors. The sheep tumors (1 male, 2 females) were 1 adrenal carcinoma, 1 pheochromocytoma and 1 thyroid carcinoma; the tumors in swine (1 male, 2 females) were 1 islet cell tumor of the pancreas, 1 pheochromocytoma (neither has been described previously in swine) and 1 adrenal adenoma. The bovine tumors included 1 thyroid carcinoma and 1 solid carcinoma of thyroid or possibly parathyroid origin (adult males), 1 eyelid tumor resembling thyroid carcinoma (a male calf), 7 pheochromocytomas and 25 adrenocortical tumors (23 adenomas, 2 carcinomas). Most animals with endocrine tumors were old. No significant breed distribution was noted. The sex distribution could not be evaluated, since the number of adult males was small, but all cattle with adrenocortical tumors (1 with bilateral adenoma) and 6/7 with pheochromocytoma (1/6 also had lymphosarcoma) were females. The incidence of adrenocortical tumors in cattle (8% of all bovine tumors) was in agreement with previously published data.

69-1071 THE 30 YEAR TREND OF LEUKEMIA IN OLMSTED COUNTY, MINNESOTA, 1935 THROUGH 1964. (E.) Kyle, R. A. (Mayo Clin., Rochester, Minn.), F. T. Nobrega, L. T. Kurland and L. R. Elveback. Mayo Clin. Proc. 43(5):342-353, 1968.

The population of Olmsted County, Minnesota (including Rochester) increased from 43,000 in 1940 to 65,000 in 1960, with a relatively constant 60:40 urban:rural ratio. Examination of 1935-1964 records of actual residents of Olmsted County (excluding pts. admitted to the Mayo Clinic from elsewhere) showed 125 verified cases of leukemia (21% acute lymphatic, 33% acute myeloid, 1% erythroleukemia, 35% chronic lymphatic, 10% chronic myeloid excluding agnogenic myeloid metaplasia). The male:female ratio throughout this period was 1.2:1. The age- and sex-adjusted incidence/100,000 was 7.7 in 1935-44, 6.8 in 1945-54 and 9.0 in 1955-64 (8.9, 7.0 and 10.3, resp., in males; 6.7, 6.7 and 7.8, resp., in females). The leukemia incidence in the urban population in these 3 decades was 9.1, 6.4 and 10.1, resp., compared to 5.5, 7.6 and 7.2, resp., in the rural population. The leukemia incidence increased during this time in pts. over 75 (probably reflecting improved diagnostic and treatment services) and decreased in children under 10. None of these time changes was statistically significant. The onset of symptoms tended to occur during the autumn and winter. One temporal cluster was

ted: 21/69 (30%) of the cases of acute leukemia
veloid in 14/21 pts.) were diagnosed from April,
50 through December, 1962 (9% of the total
apsed time). No obvious spatial clusters were
en. Data on rediation exposure and family
stories were not evaluable in this small group
pts. These data, showing no significant change
er 30 yr., are in marked contrast to the reported
crease in leukemia mortality in the total U.S.
ite population (2.4/100,000 in 1930 to 7.5 in
53).

-1072 LEUKEMIA IN HAWAII. (E.) Jim, R. T. S.
(U. Hawaii Sch. Med., Honolulu). Cancer
(5):1060-1064, 1968.

e leukemia incidence in Hawaii from 1944-1967
s studied in several groups of pts. (including
e author's 152 cases from 1957-1967 and Hawaii
ate Tumor Registry data on 178 cases from 1960-
64). The leukemia incidence in Hawaii (av.
3/100,000/yr.; both sexes, all ages; Tumor
gistry data) was slightly lower than in the
tal U.S. white population, but significantly
gher than in Japan, Singapore and the Philippines.
e leukemia incidence was significantly higher
Hawaiian Japanese (especially pts. over 60),
inese and Filipino pts. than in their resp.
tions of origin. Chronic lymphatic leukemia
s relatively infrequent in Hawaiians of Chinese
Japanese ancestry. The age and sex distribu-
on, age distribution by morphological type and
assification of chronicity were about the same
Hawaii as elsewhere. The 1955-1964 mortality
ta (state death certificates) showed an increase
leukemia mortality after 1961, with some signs
leveling off in 1963-1967. Analysis of 1954-
64 data on 131 pts. (from the author's group
d the Honolulu Children's Hospital) showed a
gnificantly higher incidence in Oahu (2.0/100,000)
an in the other islands of the Hawaiian group
.0 in Hawaii and Maui, 0.3 in Kauai, 0.0 in
lokai). Analysis of the data from Oahu (114
ses) showed a significantly higher incidence
the urban areas (Honolulu and Kailua-Kanehoe)
an in the smaller communities (Nanakuli,
ipahu, Hauula, Wahiwa), but no clusters were
en in Honolulu.

9-1073 INCIDENCE OF SOME MALIGNANT HEMOPATHIES
IN THE POPULATION OF TURIN. I. LEUKE-
IAS. (It.) Gagna, C. (U. Turin, Italy), E.
slenghi, V. Battistini and V. Prato. Minerva
ed. 59(67-68):3484-3490, 1968.

xamination of death certificates from 1954-1966
inclusive) showed leukemia as the cause of death
n 694/131,461 cases (0.53%), including 405/69,668
ales (0.58%) and 289/61,773 females (0.47%).
significant sex difference was seen in the total
eukemia death rate/1 million population/yr.
63.1 in men, 41.7 in women; total 52.4) and in
he death rates from chronic leukemia (29.8 and
6.6, resp.; total 23.0) and chronic lymphatic
leukemia (15.6 and 6.5, resp.; total 10.9). A male preponderance was seen in all age groups. All pts. under 20 had acute leukemia, with a mortality rate/1 million/yr. of 33.8, compared to 39.9 at age 50+ (not a significant difference) and 20.0 at age 20-50 (a significant decrease). The total leukemia mortality rate/1 million/yr. increased with age (33.8, 30.4 and 103.0 at age 0-20, 20-50 and 50+, resp.); the chronic leukemia mortality rate rose from 10.4 at age 20-50 to 63.1 at age 50+. The total leukemia mortality rates rose from 50.39/1 million population in 1954-1960 to 58.20 in 1961-1966 (48.64 to 56.74/10,000 deaths), but this increase was not significant.

69-1074 INCIDENCE OF SOME MALIGNANT HEMOPATHIES IN THE POPULATION OF TURIN. II. HODGKIN'S DISEASE, LYMPHOSARCOMA, RETICULOSARCOMA. (It.) Gagna, C. (U. Turin, Italy), E. Uslenghi, V. Battistini and V. Prato. Minerva Med. 59(67-68):3491-3495, 1968.

Examination of death certificates from 1954-1966 (inclusive) showed malignant lymphomas as the cause of death in 532/130,929 cases (0.40%), including 324/69,364 males (0.46%) and 208/61,565 females (0.34%). The histological diagnosis was Hodgkin's disease (HD) in 276/532 (51.88%), lymphosarcoma (LS) in 127/532 (23.87%) and reticulum cell sarcoma (RS) in 129/532 (24.25%). The total mortality rate/1 million/yr. was significantly higher in males than in females (50.34 and 29.96, resp.); male and female mortality rates were 25.63 and 15.99, resp., in HD, 12.12 and 7.06, resp., in LS and 12.59 and 6.91, resp., in RS. A male preponderance was seen at all ages. The mortality/1 million/yr. from HD, LS and RS in pts. under 20 was about the same (4.33, 3.09 and 4.02, resp.); no significant increase in the LS or RS mortality was seen in pts. in the 20-50 age group (5.83 and 8.20, resp.), but the mortality rate increased significantly in pts. over 50 (to 20.51 and 16.83, resp.). HD mortality increased significantly at all ages (21.43 at age 20-50, 33.14 at age 50+). Total lymphoma mortality/1 million/yr. rose significantly with age (11.44, 35.46 and 70.48 at ages 0-20, 20-50 and 50+, resp.). No significant differences were seen in mortality rates in 1954-1960 as compared to 1961-1966.

69-1075 BURKITT'S TUMOR. CONTRIBUTION TO THE CASES OBSERVED IN POLAND. (Pol.) Woyke, S. (Pomerania Acad. Med., Szczecin, Poland). Nowotwory 18(3):265-269, 1968.

Data on 5 children with typical Burkitt's lymphoma of the abdomen (no facial involvement was noted) seen in the Szczecin area from 1962-1967 are presented. This is believed to be the first record of Burkitt's lymphoma in Poland.

69-1076 APPENDECTOMY AND CANCER RISK. AN EPIDEMIOLOGICAL EVALUATION. (E.) Hyams, L. (Rutgers Med. Sch., New Brunswick, N. J.) and E. L. Wynder. J. Chronic Dis. 21(6):391-415, 1968.

The frequency of appendectomy (appx.) was studied by interviews in 1582 subjects with or without cancer in New York City in 1965-1966 (900 other young, healthy subjects were studied by questionnaire). The control group (healthy subjects and pts. with non-malignant diseases) included 400 men and 276 women, with an appx. frequency of 17.5% and 33.3%, resp. (total 23.9%). Of the 609 pts. with cancer other than leukemia and lymphoma, 15.3% of the 320 men and 36.3% of the 289 women had undergone appx. (total 25.4%). Comparisons of age- and sex-adjusted appx. frequencies in these cancer pts. and the controls showed no significant differences in men. In women, the appx. frequency was increased in pts. with cancer of the breast or colon + rectum, but this difference was regarded as coincidental, because the difference was primarily the result of an increased frequency of appx. incidental to other surgery. In 180 men and 117 women with leukemia and lymphoma, the appx. incidence (17.8% and 20.5%, resp.) was significantly different from values in the healthy control group only in men with Hodgkin's disease, who showed a high frequency of primary appx. (22/100), particularly when considering their relatively low ages. Epidemiologic factors of significance in the appx. frequency included race (males only), histories of abdominal surgery (both sexes), U.S. birth and various parameters of socioeconomic status (women only), but no correlation between appx. and various parameters of smoking habits was noted.

69-1077 APPENDECTOMY PREVALENCE IN HOMOGENEOUS POPULATIONS. (E.) Friskey, R. W. (Northwestern U. Med. Sch., Chicago, Ill.). J. Chronic Dis. 21(6):387-389, 1968.

The prevalence of appendectomy (appx.) was studied in 4 homogeneous female populations: 262 women (age 40) admitted to a single hospital for any reason in 1959-1960 (Group A); 64 women (age 40), employees of 1 firm, responding to a questionnaire (Group B); 79 women under 40 with breast carcinoma, admitted to this hospital in 1955-1964 (Group C); and 189 women over 60 dying of non-malignant diseases and autopsied at this hospital in 1958-1964 (Group D). Most pts. were white. The total incidence of appx. was significantly higher in Group A (116/262 = 44.3%; increasing to 50.2% in the next 5 yr.) than in Group B (13/64 = 20.3%), especially the incidence of primary appx. (93/262 and 9/64 = 35.4% and 14.0%, resp.). The difference in total appx. frequency between Group C (30/79 = 38.4%) and Group A was not significant. Caesarean section had been performed significantly more often in Group C (6/64 = 7.6%) than in Group A (4/262 = 1.5%), but the significance of this finding was unknown. The appx. frequency in the older pts. of Group D (58/189 = 30.6%; for appendicitis in 27/189 = 14.2%) was significantly higher than in Groups A through C. Since appendicitis is predominantly a disease of younger pts., and since incidental surgery including appx. is performed in increasing frequency in older pts., it is concluded that comparison of the incidence of specific diseases (such as breast carcinoma) in pt. groups of different ages and sources, with respect to histories of appx., is misleading.

69-1078 STATISTICAL INVESTIGATIONS ON GENETIC ASPECTS OF GASTRIC CARCINOMA. (Jap.) Takei, K. (Fukushima Med. Coll., Japan). Jinrui Idengaku Zasshi (Jap. J. Hum. Genet.) 13(1):67-80, 1968.

The incidence of stomach carcinoma was studied in the adult relatives of 586 adults with stomach carcinoma. Stomach cancer was seen in 114/3533 (3.23%) of their blood relatives, 12/586 (2.05%) of their spouses (6/185 husbands, 6/401 wives = 3.24% and 1.50%, resp.) and 66/3484 (1.89%) of their relatives by marriage. The stomach cancer incidence in blood relatives of the cancer pts. was 70/1162 (6.02%) in parents (23/586 in mothers, 47/576 in fathers = 3.92% and 8.16%, resp.) and 44/2371 (1.86%) in siblings (24/1177 in brothers, 20/1194 in sisters = 2.04% and 1.68%, resp.). The stomach cancer incidence in blood relatives of the pts. was 1.7-fold higher (highly significant) than in the relatives of their spouses; this ratio was higher in the probands' parents (1.9; 1.7 in fathers, 2.5 in mothers) than in their siblings (1.5; 1.2 in brothers, 1.8 in sisters). The stomach cancer incidence in spouses of the pts. was not significantly different from the incidence in like-sex siblings, either of the pts. or of the spouses. The incidence of tumors other than stomach cancer (not specified) was elevated in the mothers of the cancer pts. (31/586 = 5.29%), but not in their other blood relatives (1.80%), spouses (1.37%) or relatives by marriage (1.66%). It is suggested that the development of stomach carcinoma is at least partially dependent on genetic factors, which are largely specific for the stomach.

69-1079 PRIMARY ADENOCARCINOMA OF THE ESOPHAGUS. (E.) Turnbull, A. D. M. (Mem. Hosp. Cancer Allied Dis., New York, N. Y.) and J. T. Goodner. Cancer 22(5):915-918, 1968.

A review of 1926-1966 data of 1859 cases of primary esophagus cancer (excluding pts. with primary stomach cancer extending to the distal esophagus) showed epidermoid carcinoma in 1529/1859 and adenocarcinoma in 45/1859 (2.4% of the group). The male:female ratio in the pts. with adenocarcinoma was about 3:1, compared to 4:1 in pts. with epidermoid carcinoma; the av. age in both groups was about the same (61.7 yr. in pts. with adenocarcinoma). Most pts. with either tumor were Caucasians; 6% with epidermoid car-inoma and 1/45 with adenocarcinoma were Negro. he clinical behavior and the prognosis (poor) f both tumors were similar.

9-1080 EPIDEMIOLOGY OF PANCREATIC CANCER IN CONNECTICUT. (E.) Moldow, R. E. (State Dept. Health, Hartford, Conn.) and R. R. onnelly. Gastroenterology 55(6):677-686, 1968.

nalysis of 1955-1964 data for Connecticut residents showed an age-adjusted av. annual g.i. cancer incidence/100,000 of 93.5 in men (12,032 cases) and 65.7 in women (10,219 cases). The ncidence by site in men and women was: large ntestine = 30.1 and 29.6, resp.; stomach = 20.1 and 10.1, resp.; rectum = 18.5 and 12.8, resp.; liver and biliary tract = 5.2 and 4.9, resp.; esophagus = 7.4 and 1.2, resp.; small intestine = 1.0 and 0.8, resp.; and pancreas = 10.1 and 5.6, resp. (10.8% and 8.5%, resp., of all g.i. tumors). The pancreas cancer incidence in men increased from 1935-1939 (6.9/100,000) to 1960-1964 (9.9); in women it remained stable (5.3 and 5.9, resp.). Pancreas cancer was identified histologically in 865 Connecticut residents from 1957 through 1963; further epidemiologic studies were based on a sample of 257 pts. from this group. The male:female ratio was 1.5:1; the women were significantly older than the men (av. 67.1 and 62.6 yr., resp.). The observed/expected ratios in white and Negro pts. were 246/250.5 and 11/6.5, resp.; the differences, though not statistically significant, suggested an increased risk of pancreas cancer in Negro pts. A seasonal variation (peaks in May and August) was noted. No significant variations in observed/expected incidence with respect to ABO blood group, religion, place of birth, histories of biliary disease (age- and sex-adjusted data; 10% had diabetes mellitus), marital status, place of residence or socioeconomic status were seen.

69-1081 CANCER OF THE LARYNX IN CONNECTICUT, 1935-1959. (E.) Von Essen, C. F. (Yale U. Sch. Med., New Haven, Conn.), D. P. Shedd, R. R. Connelly and H. Eisenberg. Cancer 22(6):1315-1322, 1968.

Connecticut Tumor Registry data from 1935-1959 disclosed 1438 pts. with cancer of the larynx. Nearly all were white. The male:female ratio was 12:1, with a significant sex difference in age distribution (a relative increase in females in the youngest and oldest groups); the median ages in men and women were 64 and 58 yr., resp. Age-specific incidence increased steadily and markedly in men until age 70-74, then decreased; in women, the incidence increased only slightly before age 70-74, with a steeper increase thereafter. The age-adjusted av. annual incidence/100,000 over the entire 25-yr. period was 5.3 in men and 0.4 in women; it increased steadily in men, from 3.8 in 1935-1939 to 6.1 in 1955-1959, whereas in women the incidence fluctuated from 0.3 to 0.6 during the 5-yr. periods studied. Data from 1960-1962 showed a sharp increase in both men and women (8.3 and 0.9, resp.). The increased incidence of larynx cancer in men during this 25-yr. period coincided with an even greater increase in the lung cancer incidence in Connecticut men (10.3 in 1935-1939, 43.3 in 1955-1959). It is suggested that whereas lung cancer is related to cigarette smoking, laryngeal cancer may be more closely related to pipe and cigar smoking; the smaller increase in larynx cancer might be compatible with the fact that most of the recent increase in tobacco consumption is attributed to increased cigarette smoking.

69-1082 TUBERCULOSIS AND CANCER OF THE LUNG. (Rus.) Tsigelnik, A. Ia. (First Med. Inst., Leningrad, USSR), O. I. Bazan and B. Ia. Shapiro. Vop. Onkol. 14(9):3-10, 1968.

Clinical and autopsy data from Leningrad showed a decrease in the incidence of pulmonary tuberculosis (TB) in pts. dying of cancer, from 275/1722 (nearly 16%) in 1932-1935 to 67/1318 (about 5%) in 1951-1965; in pts. dying of lung cancer, the incidence of TB was 16.4% (73/444) in 1932-1935 and 6.2% (26/418) in 1951-1965. The lung cancer incidence in pts. dying of TB increased from 0.7% (73/9650) in 1932-1935 to 5.5% (26/460) in 1951-1965; however, since the incidence of lung cancer among persons dying of all causes in 1951-1965 was about the same (5.1%), no epidemiologic relationship between lung cancer and TB was apparent. The total incidence of TB fell significantly between 1948 and 1962 in pts. under 30 (at age 30-49, the incidence fell through 1957, then remained stationary; in pts. over 50 the TB incidence increased). Pathological studies of several pts. with TB and lung cancer showed that the 2 diseases developed independently, usually in different areas of the lungs; however, lung cancer could exacerbate the TB in pts. whose bronchial drainage was blocked by tumor deposits.

69-1083 TUBERCULOSIS AND CARCINOMA OF THE LUNG. (E.) McQuarrie, D. G. (U. Minnesota, Minneapolis), D. M. Nicoloff, D. Van Nostrand, K. Rao and E. W. Humphrey. Dis. Chest. 54(5): 427-432, 1968.

Examination of 1947-1965 records of the Minneapolis VA Hospital disclosed 1247 new cases of pulmonary tuberculosis (TB) and 1164 pts. with lung cancer, including 43 (3.7%) with TB. Av. ages were 61 and 63 yr., resp.; histories of heavy smoking (at least 1 pack/day) were obtained from 49% and 63%, resp. (this figure may be low, since not all charts recorded smoking habits accurately). The contributions of TB and smoking to lung cancer could not be separated. The percentage distribution of histological tumor types and the locations of the tumors were about the same in both groups. Cancer and TB were identified essentially concurrently in 26% (simultaneously in 8/43, within less than 1 yr. in 14/43) and at intervals of 20 yr. or more in 14/43 (32%). Cancer and TB were found in the same areas of the lung in 20/43, but since TB affects many areas of the lungs and bronchi in addition to those areas later seen as X-ray densities, no conclusions about the relationship between endobronchial scars and later tumor development could be drawn.

69-1084 CANCER OF THE FLOOR OF THE MOUTH: A SURVEY OF THE PROBLEM IN VICTORIA. (E.) Fleming, W. B. (MacCallum Clin., Melbourne, Australia). Med. J. Aust. 2(10):434-436, 1968.

In 1964, malignant tumors accounted for 4312/27,548 deaths from all causes in Victoria, with only 39 deaths from oral cancer. Data on 165 consecutive pts. with cancer (all with squamous cell carcinoma) of the mouth floor and/or lower alveolus seen in 1953-1966 were discussed. A significant sex difference in peak age incidence was seen; 87/120 men were over 60 (peak at age 60-70) and 27/45 women were over 70 (peak at age 70-80). Records concerning smoking habits were incomplete, but they suggested that smoking might account for this sex difference. Almost all of the men and younger women were smokers, while the older women were nonsmokers. It is suggested that smoking may not cause oral cancer, but may be a precipitating and/or potentiating factor causing the appearance of cancer at a younger age in smokers than in nonsmokers.

69-1085 LUNG CANCER MORTALITY ACCORDING TO BIRTHPLACE. (E.) Coy, P. (British Columbia Cancer Inst., Vancouver, Canada), S. Grzybowski and J. F. Rowe. Canad. Med. Ass. J. 99(10):476-483, 1968.

Age-adjusted male lung cancer mortality/100,000 in British Columbia (B.C.) rose steadily from 1931-1965 (5.0 to 33.5), but the increase appeared to be slowing down. Lung cancer mortality was significantly higher in the United Kingdom (U.K.; England/Wales) than in B.C., but age-specific patterns were similar. Age-adjusted mortality rates (1961) in U.K.-born male residents of B.C., Ontario and Saskatchewan were significantly higher (39.2, 40.1 and 32.2, resp.) than in Canadian-born men (21.2, 20.9 and 13.6, resp.) or Canadian men born in other countries (30.4, 39.2 and 17.4, resp.). The 1964 mortality rates at age 45-54, 55-64, 65-69 and 70+ were significantly lower in U.K.-born male B.C. residents (40.0, 170.1, 272.1 and 340.4, resp.) than in male U.K. residents of the same ages (91.3, 293.8, 495.7 and and 466.8, resp.). A detailed study of smoking habits in Canadian- and U.K.-born male B.C. residents was in progress at the time of publication, but a previously published report showed a significantly higher cigarette consumption in the U.K. than in Canada (adults) from 1920 through 1940 (but not in 1960). The significant differences in male lung cancer mortality between Saskatchewan and B.C. or Ontario, and between U.K. residents and U.K.-born B.C. residents, were attributed to lower air pollution in Canada. The significant differences between U.K.- and Canadian-born Canadian men were attributed to the residual effects of air pollution in U.K. emigrants, most of whom were over 20 when they moved to Canada.

69-1086 THE EXECUTIVE HEALTH EXAMINATION. (E.) Wright, H. B. (Inst. Directors Med. Ctr., London). Roy. Soc. Health J. 88(5):251-258, 1968.

Routine medical examinations (predominantly to detect cardiovascular disease) were performed on over 4000 men beginning in June, 1964; at the time of report, 6500 initial and 3000 repeat examinations had been performed. Most of the pts. were businessmen. Initial examinations of 4052 men revealed 1 or more diseases for the first time in 1481 cases; this included 9 pts. with cancer (0.2% of the group) and benign tumors in 16 pts. (0.4% of the group; no other details). At the initial examination of 4051 men, the reported daily cigarette consumption was 1-10 in 13%, 11-20 in 16% and over 20 in 15%; 34% of the men (most in the under-45 group) had never smoked and 22% (most in the over-45 group) had stopped smoking. Follow-up examination (after at least 1 yr.) of 1498 men, including 712 cigarette smokers, showed unchanged smoking habits in 464/712 (67%), increased cigarette consumption in 26/712 (2%) and reduced cigarette smoking or a change to pipes or cigars in 158/712 (22%), while 64/712 (9%) had stopped smoking. In all, 56% of this group were or had become non-smokers at the time of report, but 31% still smoked 11 or more cigarettes/day.

69-1087 PROSTATIC CANCER IN BANTU. (E.) Houston, W. (Bulawayo Group Hosp., Rhodesia). J. Roy. Coll. Surg. Ireland 4(2): 79-81, 1968.

Published data on the marked differences in the incidence of prostate cancer between ethnic groups (over 20/100,000 in Caucasians, 5 or less in Africans, very low in Orientals) are discussed. In the author's group of 253 African men (Bulawayo, Rhodesia) with prostate tumors (71.6% benign) seen over 6 yr., the incidence of prostate carcinoma/100,000 hospital admissions was 160, and the incidence/100,000 African population in Bulawayo was 3.4. In a discussion of data from a previously published report, describing the incidence of prostate carcinoma in Bantu men (Durban, South Africa) as high (130 pts., 56% with benign disease; 192/100,000 hospital admissions), the author calculated the prostate carcinoma incidence/100,000 African population as 6.5 in this group, which is in the

w range. It is suggested that the low inci-
ence of prostate carcinoma in African men is
elated to the high level of circulating estro-
ens, possibly a consequence of liver disease.

-1088 PRIMARY CARCINOMA OF THE URETER. (E.)
Hanche-Olsen, A. (Cent. Hosp., Oslo)
d P. Seland. *Scand. J. Urol. Nephrol.* 2(2):
3-144, 1968.

wo new cases in men are reported, bringing the
umber of known cases of this rare tumor in
orway to 34 (32 were seen from 1953-1964; 18
en, 14 women).

-1089 INCIDENCE AND RELATIVE FREQUENCY OF
BENIGN AND MALIGNANT OVARIAN NEOPLASMS.
.) Bennington, J. L. (U. Washington Med. Sch.,
eattle), B. R. Ferguson and S. L. Haber.
ostet. *Gynec.* 32(5):627-632, 1968.

he 1958-1963 data from female members of the
aiser Foundation Health Plan (Kaiser Foundation
ospital, Oakland, California; 434,506 admissions
uring this period) revealed 549 ovarian tumors.
f the 443 benign tumors (serous or mucinous
ystadenoma, benign teratoma, thecoma-fibroma,
renner tumor), 404 were unilateral and 39 were
ilateral. Of the 106 malignant tumors (62
nilateral, 44 bilateral), 26 were metastatic
oreast 13, uterus 6, g.i. tract 4, urinary tract
, unknown primary 1) and 80 were primary (serous
r mucinous cystadenocarcinoma, endometrioid or
ranulosa cell carcinoma, etc.). The incidence
f all primary ovarian tumors/100,000 female
opulation in this group was about the same as
n the female population of New York State: 0
t age 0-19, 7.2 at age 20-44, 27.6-28.1 at age
5-64, 72.6 at age 65-74 and 158 at age 75 and
ver. The increasing proportion of malignant
umors at advanced ages suggested the possibility
f malignant transformation of benign tumors
e.g., adenoma to carcinoma).

9-1090 CANCER AND PREGNANCY. (E.) Phelan,
J. T. (Roswell Park Mem. Inst.,
uffalo, N. Y.). *New York J. Med.* 68(23):
011-3017, 1968.

he treatment and prognosis of malignant tumors
n pregnancy is discussed on the basis of a
iterature review (39 references) and a 20-yr. sur-
ey of the records of 52 pts. with cancer of the
ervix (26), breast (11), ovary (1), rectum (1)
r thyroid (3), melanoma (3), leiomyosarcoma (1),
steogenic sarcoma (1) or 2 primary tumors
eveloping in each of 2 pregnancies (1; carcinoma
f the cervix and tongue). In the pt. with
eiomyosarcoma and 3/10 with advanced breast
ancer, abortion seemed to exacerbate the disease
4/4 died within 6 mo.); in 7/10 with advanced
oreast cancer who had normal deliveries, the av.
urvival time was 14 mo. The 14/52 who had normal deliveries gave birth to normal infants, without signs of maternal transmission of the malignant disease. One pt. with thyroid cancer and 1 pt. with localized breast cancer later had 2 pregnancies each without complications, and were alive without recurrence after at least 5 yr. It is concluded that abortion may be contraindicated in some malignant diseases (such as melanoma) and is probably unnecessary in others, but that lactation (which could not be studied in this group) should be avoided.

69-1091 CLINICAL AND THERAPEUTIC OBSERVATIONS OF GENITAL CANCER AT THE JENA UNIVERSITY GYNECOLOGY CLINIC FROM 1946 TO 1967. (Ger.) Carol, W. (U. Jena, Germany) and W. Müller. *Zbl. Gynaek.* 90(40):1337-1345, 1968.

From 1946-1967, 5901 women with malignant genital tumors were seen at the authors' clinic (the total number of clinic pts. is not stated). The primary tumor sites were the cervix uteri in 69% (4065 pts.), uterus in 15% (892 pts.), ovary in 7% (408 pts.; excluding pts. with sarcomas, metastases, dysgerminomas or granulosa cell tumors), vagina in 4% (235 pts.), vulva in 2.7% (163 pts.) and other types and sites in 2.3% (138 pts.; including sarcoma). The ratio of cervix:uterine cancer fell from 4:1 in 1946-1954 and 1955-1959 to 3.2:1 in 1960-1967; the av. age of pts. with uterine cancer was 58.6 yr. Almost 75% of the pts. with cervix cancer admitted in 1946-1947 had Stage II or III disease, but the proportion of pts. with Stage I disease increased steadily thereafter, to 48% in 1966-1967; this was attributed to better diagnostic procedures and public education.

69-1092 ABO BLOOD GROUPS AND THEIR RELATIONSHIP WITH CANCER OF THE CERVIX UTERI. (E.) Gupta, P. (S. P. Med. Coll., Bikaner, Rajasthan, India). *J. Indian Med. Ass.* 51(2):69-71, 1968.

The incidence of blood group A in 208 women with cervix cancer (37.02%) was 14.92% higher than in 371 normal adults from the same area (22.10%), a highly significant difference. The incidence of group O in the cancer pts. (23.56%) was 11.21% below normal (34.77%); the frequencies of groups B and AB in the cancer pts. (33.17% and 6.25%, resp.) were slightly below normal (35.58% and 7.55%, resp.).

69-1093 CERVICAL CANCER SCREENING IN NORTHERN IRELAND. (E.) Robertson, J. H. (Belfast City Hosp., Northern Ireland) and E. H. Crozier. *Ulster Med. J.* 37(2):136-145, 1968.

Cervical smears were obtained from 54,836 women over 20 between 1965-1968 (about 11% of the female population of Northern Ireland over 20). The incidence of cervical lesions was higher in 22,234 women screened in hospital gynecology clinics than in 32,064 well women studied elsewhere (including family planning and prenatal clinics), but the age-specific incidence of the diseases was about the same. In both groups, cervical dysplasia was most prevalent at age 20-29, carcinoma in situ at age 40-49 (3.4/1000 in well women, 4.7/1000 in hospital pts.) and invasive carcinoma in women over 60 (6.6 and 11.1/1000, resp.). Follow-up biopsy examination of 293 women with abnormal smears showed 76 with invasive carcinoma, 124 with carcinoma in situ, 35 with dysplasia, 8 with cervicitis and 50 lesions of unknown histology. Tumor cells were present in the smears of 8/35 with subsequently diagnosed dysplasia; cervical smear patterns showed only dysplasia in 25 pts. with lesions later diagnosed as invasive carcinoma (2/76) or carcinoma in situ (23/124). Since only 28.6% of the women screened by centers other than hospital gynecology clinics were over 39 yr. old, it is concluded that the proportion of young women was too high to make this screening program most effective in reducing the cervix cancer incidence.

69-1094 DETECTION OF UTERINE CANCER. HIGH AND LOW RISK GROUPS. (E.) Hammond, E. C. (Amer. Cancer Soc., Toledo, Ohio), E. L. Burns, H. Seidman and C. Percy. Cancer 22(6):1096-1107, 1968.

Follow-up data on 39,756 women without uterine or cervix cancer (including carcinoma in situ) at the initial cytological screening in 1947-1959 were studied. Initial cervical smears were classified as Papanicolaou Class IIIA or higher in 436 women, of whom 47 (10.8%) developed cancer in the next 14 yr. (28/47 within 4 yr.). Of 39,320 with Class I or II smears, 350 developed cancer in the next 14 yr.; 56/88 invasive and 56/89 in situ carcinomas of the cervix were seen in the first 5 yr. A 3-yr. follow-up of 19,252 with Class I or II smears showed 24 invasive cervical carcinomas within 3 yr. (10/24 within 2 yr.), suggesting a very short latent period in some pts. Genital complaints (vaginal spotting, bleeding or discharge) were reported at the initial examination by 8203/39,320 with Class I or II smears. The incidence of uterine cancer/1000 women/yr. in these pts. and in 31,112 without genital complaints at the initial examination was 2.76 and 0.82, resp. (ratio of 3.37:1) in the first 5 yr., 1.98 and 0.86, resp., (2.3:1) in the next 5 yr. and 2.13 and 1.20, resp., (1.78:1) in the next 4 yr. It is concluded that women with Class IIIA or higher cervical smears and women with genital complaints associated with Class I or II smears are high-risk groups, who should be followed up at intervals of no more than 1 yr. (preferably every 6 mo.).

69-1095 DETECTION OF UTERINE CANCER. RESULTS OF A COMMUNITY PROGRAM OF 17 YEARS. (E.) Burns, E. L. (Toledo Hosp., Ohio), E. C. Hammond, C. Percy, H. Seidman and T. W. Gorski. Cancer 22(6):1108-1119, 1968.

From 1947-1963, 100,257 women were screened for uterine cancer; about 75% were residents of Lucas County including Toledo (over 67% of the female residents over 30 were seen). Most were in the 25-50 age group. The screening program identified 1095/1253 uterine and cervix cancers seen during this period. Prevalence rates at the first and second examinations (42,765 women returned within 3 yr. of the initial examination), by tumor site, were: all tumors = 7.4 and 3.0/1000 (740 and 130 pts.), resp.; corpus uteri = 1.9 and 0.9 (186 and 40 pts.), resp. (0.14 and 0.12, resp., for carcinoma in situ); cervix carcinoma in situ = 2.1 and 1.3 (213 and 54 pts.), resp.; invasive cervix cancer = 3.3 and 0.8 (333 and 35 pts.), resp. Av. ages at diagnosis of in situ and invasive corpus cancer were 49.8 and 60.0 yr., resp.; av. ages at diagnosis of in situ, early invasive and late invasive squamous cell carcinoma of the cervix were 40.3, 43.7 and 51.5 yr., resp. The age-standardized annual incidence of all uterine tumors at the initial examination fell from 17.7/1000 in 1947-1951 to 10.9 in 1952-1955, with smaller decreases thereafter (9.4 in 1956-1959, 6.6 in 1960-1963), reflecting the sharp initial decline in invasive cervix cancer (9.6 to 5.0; 3.8 after 1956). The incidence of corpus cancer fell steadily (6.7 to 1.5); the incidence of cervix cancer in situ rose from 1947-1959 (0.8 to 2.4), then fell (1.8 in 1960-1963).

69-1096 IMPACT OF A CYTOLOGIC SCREENING PROGRAM ON A GYNECOLOGIC MALIGNANCY SERVICE. (E.) Sall, S. (New York Med. Coll., N. Y.), A. Pineda, A. Sedlis and M. L. Stone. Cancer 22(6):1120-1125, 1968.

From 1960-1966, 94,778 cervical smears were obtained from 56,687 women seen at the Metropolitan Hospital Medical Center (New York City) in a systematic screening program, which involved all women admitted to the hospital gynecology clinic (and randomly selected pts. from other clinics) from 1960, and expanded to include all women admitted to the hospital after late 1965. The av. age (32.2) was 4-10 yr. below the expected age, but 35% of the women were examined during pregnancy. Cervical smears were classified as atypical, suspicious or positive in 2327, 529 and 133/94,778 examinations, resp. The prevalence of new cases of cervix cancer fluctuated between 5.5 and 6.6/1000/yr.; the relatively high incidence during pregnancy (1:284, invasive 1:1400, in situ 1:356) was attributed to the high-risk nature of the population (no further details). As a result of this screening program, enrollment in the outpatient cancer clinic increased from 90 new cases in 1960 to 195 in 1966; in the first 5 yr., 185 new cases of cervix carcinoma *in situ* were identified. Another result of the screening program was the steady decrease in the proportion of invasive cancer at diagnosis, from 81.3% (1955-1959) to 26% (1966). The incidence of cancer of the ovary, vulva and vagina remained about the same during this period.

69-1097 RELATIVE INCIDENCE OF SO-CALLED CARCINOMA *IN SITU* OF THE UTERINE CERVIX. (Ger.) Legerlotz, C. (Wilhelms-U., Munster, Germany) and P. Stüper. *Geburtsh. Frauenheilk.* 28(10):953-960, 1968.

From 1962 through 1966, 1539 women with cervix cancer were treated by the authors. The diagnosis was made by the authors in 287 pts. and elsewhere in 1252 pts. Carcinoma *in situ* was diagnosed by the initial tests in 55 pts.: 3.5% of the entire treated group, but 19.5% of the cases diagnosed by the authors. These numbers were reduced to 2.8% and 13.6%, resp., when further examination of surgical specimens (conization or amputation of the cervix or uterus) altered the diagnosis in 11 pts. to benign epithelial atypia. Since the diagnostic methods used for cervix cancer vary widely in their efficiency, it is concluded that no universally valid data on the incidence of cervix carcinoma *in situ* can be provided.

69-1098 CARCINOMA *IN SITU* OF THE CERVIX IN CONNECTICUT. A REVIEW, 1949-1962. (E.) Hulme, G. W. (Connecticut State Dept. Health, Hartford) and H. S. Eisenberg. *Amer. J. Obstet. Gynec.* 102(3):415-425, 1968.

Results of gynecological screening tests from all general, private and government hospitals in Connecticut from 1949-1962 were evaluated. Uterine cancer was seen in 8247 women, cervix cancer in 4517/8247 and carcinoma *in situ* (CIS) in 1330/4517. Only 8.6% of the CIS cases were seen in 1949-1962. The CIS incidence/100,000 women over 20 increased from 3.7 in 1949 to 29.0 in 1962 and 34 in 1964, with a particularly marked increase after 1953. The peak age of CIS pts. fell from 40-49 yr. in 1949-1956 to 30-39 yr. in 1957-1962. This significant increase in CIS coincided with a slower but steady reduction of about 33% in the incidence of invasive carcinoma (from about 30/100,000 in 1949 to 18.8 in 1964; peak age 60-69). A marked reduction in the invasive cancer incidence by 1972, as its precursor CIS is identified and treated, is predicted, with an eventual plateau of the CIS incidence at the pre-1949 level of invasive cancer. Second primary tumors were seen in 70 pts. with CIS and 1 pt. had 2 additional primary tumors (breast and lung). The sites of the second primary tumors in these pts. were: breast (19), colon/rectum (14), skin (8), stomach (6), vulva (4), endometrium and leukemia (3 each), ovary and bladder (2 each), kidney (1), and unknown or undifferentiated (8). The recurrence rate in treated CIS pts. was 8.1% (4 pts.).

69-1099 EPIDEMIOLOGIC EVIDENCE FOR THE SPECTRUM OF CHANGE FROM DYSPLASIA THROUGH CARCINOMA *IN SITU* TO INVASIVE CANCER. (E.) Johnson, L. D. (Harvard Med. Sch., Boston, Mass.), R. J. Nickerson, C. L. Easterday, R. S. Stuart and A. T. Hertig. *Cancer* 22(5):901-914, 1968.

Abnormal cervical smears were seen in 219/11,121 women (examined in 1958-1963); biopsies (obtained in all but 63/219) confirmed cervical dysplasia (CD) in 82/219, carcinoma *in situ* (CIS) in 31/219 and invasive carcinoma (IC) in 4/219; while 39/219 biopsies were negative. Repeat screening (over the next 8 yr.) of 8020 women with initially negative smears demonstrated abnormal cervical epithelium in 189/8020; biopsies (obtained in all but 52/189) confirmed CD in 81/189, CIS in 3/189 and IC in 0/189, while 53/189 were negative. The CIS incidence in pts. with abnormal smears but negative biopsies and in pts. with CD in both cervical smears and biopsies was 22-fold higher (4.4/1000 pt.-yr.; 2/187 and 2/162 pts., resp.) than in pts. with previously negative smears (0.2/1000 pt.-yr. = 3/8020 pts.). The discovery rate of CD, CIS and IC combined was constant with age (20-70 yr.) but the incidence of CIS and IC increased with age. CD was the initial abnormality in all age groups. Follow-up studies (up to 9 yr.) of 141 pts. with biopsy-confirmed CD showed regression to normal in 50.4%, regression and recurrence of CD in 21.3%, regression with recurrence and progression to CIS in 1.4% and no change in 27.0%. The incidence of CD regression was unexpectedly higher in pts. with positive smears but negative biopsies and in pts. not undergoing biopsy (89.1% and 73.7%, resp.) than in pts. with CD presumably removed by biopsy (57.7%). Follow-up studies demonstrated that CIS develops from areas of recurrent CD.

69-1100 KINETICS OF CHRONIC LYMPHOCYTIC LEUKEMIA. (E.) Schiffer, L. M. (Brookhaven Nat. Lab., Upton, N. Y.). *Ser. Haemat.* 1(3):3-23, 1968.

A summary and discussion of available data (123 references) on cell proliferation in chronic lymphocytic leukemia (CLL), leading to the suggestion that 1 or more normal and 1 or more leukemic lymphocyte populations are present in CLL. Evidence for the presence of a slowly exchanging compartment, a tissue lymphocyte compartment and a compartment of "direct entry" lymphocytes closely related to the circulating lymphocytes is discussed. The peripheral blood lymphocyte compartment is apparently not maintained by immediate lymphocyte circulation through the thoracic duct. It is suggested that the major symptoms of CLL result from the accumulation of long-lived leukemic lymphocytes.

69-1101 GRANULOCYTE KINETICS IN CHRONIC MYELOCYTIC LEUKEMIA. (E.) Chervenick, P. A. (Rutgers Med. Sch., New Brunswick, N. J.) and D. R. Boggs. Ser. Haemat. 1(3):24-37, 1968.

A summary and discussion of available data (72 references) on cell proliferation in chronic granulocytic leukemia (CGL), leading to the suggestion that CGL is a clonal tumor arising from the induction of the Ph^{1} chromosomal abnormality in a single stem cell, belonging to a compartment that can differentiate into granulocytic, megakaryocytic and RBC precursors. Being unresponsive or less responsive to the factors regulating normal stem cell proliferation, this Ph^{1}-positive cell has a growth advantage over the normal stem cells in the same compartment and its descendants eventually dominate the compartment. The Ph^{1}-positive cells follow the granulocytic and megakaryocytic maturation pathways, in preference to the RBC pathway.

69-1102 ACUTE LEUKEMIA: THE KINETICS OF LEUKEMIC BLAST CELLS IN MAN. AN ANALYTICAL REVIEW. (E.) Killmann, S.-A. (U. Hosp. Copenhagen). Ser. Haemat. 1(3):38-102, 1968.

The kinetics of proliferation of leukemic blast cells (LBC) and of normal granulocyte precursors are compared, on the basis of a re-evaluation of available data (99 references). It is suggested that the general assumption that LBC are rapidly proliferating cells is apparently applicable only to a minority of cases. In most pts., the av. LBC generation time is longer than the generation time for normal granulocyte precursors. At the time of diagnosis, a larger proportion of LBC than of normal granulocyte precursors belong to a non-proliferating pool. However, the kinetics of LBC proliferation vary from 1 pt. to another and possibly from 1 stage of the disease to another.

69-1103 ACUTE LEUKEMIA: DEVELOPMENT, REMISSION/RELAPSE PATTERN, RELATIONSHIP BETWEEN NORMAL AND LEUKEMIC HEMOPOIESIS, AND THE 'SLEEPER-TO-FEEDER' STEM CELL HYPOTHESIS. (E.) Killmann, S.-A. (U. Hosp. Copenhagen). Ser. Haemat. 1(3):103-128, 1968.

In a summary and discussion of available data (116 references), a new hypothesis for the mechanism of suppression of normal hematopoiesis in the presence of leukemic blast cells is presented. Some normal hematopoietic cells may become dormant ("sleepers") after a number of mitotic generations after the zygote stage, whereas others remain active ("feeders") and supply both the "feeder" pool and normally differentiating hematopoietic compartments. The existence of a blocking mechanism preventing the transformation of a "sleeper" cell into a "feeder" clone, unless and until the "feeder" pool is exhausted, is postulated. A leukemogenic event, occurring in 1 or more of the "sleeper" cells, would lead to clinical leukemia if an abnormal "sleeper" is transformed into a "feeder" clone, and a remission would develop if the leukemic "feeder" clone is exhausted (by chemotherapy, for example) and the subsequently activated "sleeper" cell is normal. Some clinical features of human acute leukemia are consistent with this hypothesis, but others suggest that the "feeder" pool may be replenished by more than 1 of the "sleeper" cells. This mechanism seems to be less applicable to acute lymphocytic leukemia than to the myeloid leukemias.

69-1104 THE STOCHASTIC THEORY OF CELL PROLIFERATION. (E.) Bronk, B. V. (City U. New York, N. Y.), G. J. Dienes and A. Paskin. Biophys. J. 8(11):1353-1398, 1968.

A mathematical model of cell growth is described.

69-1105 DIFFERENTIATION, ONCOGENESIS AND CELLULAR PERIODICITIES. (E.) Gilbert, D. A. (Roy. Cancer Hosp., London). J. Theor. Biol. 21(1):113-122, 1968.

It is suggested that carcinogenesis involves temporal changes in the rhythmic variations of cellular constituents (which result from the operation of many metabolic control factors). Such a change was demonstrated in 2 lines of baby hamster kidney fibroblasts with cell division cycles partially synchronized by thermal shock (4°C). In the normal cell line (BHK-C13), periodic pattern changes in aldolase isozymes (measured by the ratio of fructose diphosphate: fructose monophosphate) were in phase with variations in the lactate dehydrogenase isozymes (measured by the α-ketobutyrate:pyruvate ratio). In the polyoma virus-transformed BHK-PY4 line, an antiphase relationship was seen. The rhythmic periods of these isozyme patterns were a small submultiple of the av. population generation time.

69-1106 TISSUE HOMEOSTASIS AND THE BIOLOGICAL BASIS OF CANCER. (E.) Carter, S. B. (Imp. Chem. Indust. Ltd., Alderley Park, Macclesfield, Cheshire, England). Nature (London) 220(5171):970-974, 1968.

A hypothesis is presented to account for the relationship between mitosis and the properties of the cell membrane. It is suggested that mitotic balance is primarily controlled by the degree of physical stability of the cell membrane (mutual cell adhesion). According to this hypothesis, the observed variation between cells of the same malignant tumor (size, nuclear morphology, chromosome number, etc.) would be the cause, not the result, of a breakdown in the growth control mechanisms. Factors causing any variations in the genetic potential of the cell would also affect the properties of the cell surface, not necessarily by affecting the genes specifically responsible for cell surface composition. Since an established population of malignant cells with randomly differing surface properties would show a self-perpetuating instability of growth patterns, a malignant tumor would result from this variation in the cells of the malignant clone, not from a specific abnormality in the individual cancer cells.

69-1107 SURVIVAL AMONG LEPROSY PATIENTS WITH SPECIAL CONSIDERATION OF CANCER AS A CAUSE OF DEATH. (E.) Oleinick, A. (NIH, Bethesda, Md.). Int. J. Leprosy 36(3):318-327, 1968.

Of 953 pts. (64.9% male; 741 white, 113 Negro, 99 Oriental) treated for leprosy at the Carville (Louisiana) Leprosarium from 1939 through 1963, 619 were known to be alive and 236 were known to be dead as of January 1, 1964; the other 100 pts. (10.5%) were lost to follow-up. Cumulative relative survival rates in the evaluated pts. showed a normal mortality risk in most leprosy pts., with significant exceptions in pts. with lepromatous leprosy. The observed/expected cancer mortality rate was 20/17.10 in white pts. and 1/2.61 in Negro pts. (total 21/19.71); the observed/expected mortality rate of leukemia and lymphoma was 2/1.66. These pts. excluded 3 pts. in whom the suspected diagnosis of cancer was not confirmed at autopsy, 1 pt. admitted to Carville with symptoms attributable to lymphosarcoma, and 2 pts. with a diagnosis of cancer antedating admission. The cancer mortality rate was not increased in pts. with either type of leprosy. The normal cancer risk in these pts. provided evidence against the hypothesis of an increased cancer risk in pts. with impaired delayed hypersensitivity. The absence of a disproportionate leukemia or lymphoma risk in leprosy suggested that prolonged lymphoid stimulation has a negligible role in the etiology of lymphoid tumors.

69-1108 SOME EPIDEMIOLOGICAL ASPECTS OF THE MALIGNANT LYMPHOMATA. (E.) Modan, B. (Tel Hashomer Gov. Hosp., Israel), B. Goldman, M. Shani, I. Virag and M. Modan. Amer. J. Public Health 58(11):2082-2091, 1968.

Examination of 1960-1964 Israeli records disclosed 1260 pts. with malignant lymphoma (ML). In 828/938 evaluable pts. (Israel residents with histologically confirmed ML), the incidence was 7.1/100,000 and the male:female ratio was 1.4:1. If the other 110 pts. with "probable" ML were added, the incidence was 8.1 (male:female ratio 1.5:1). The incidence rose gradually with age until age 50 (with a slight excess in non-European pts.), then increased sharply (particularly in the Israel- and European-born). The male excess was seen in most age groups. The ML incidence in Arabs (about 10% of Israel's population) was at least as high as in Jews. At least 2 distinct disease patterns were suggested by the data: 1 type with a low incidence, prevalent in the younger age groups and with about the same incidence in all ethnic groups (with a possible slight excess in non-Europeans); the other with a higher prevalence in older age groups (the age-specific rate curve resembling that for other malignant tumors), more prevalent in the Israel- and European-born than in the Asian- or African-born. Focal ML was more prevalent in younger pts. and the Asian- and African born, and lymph node involvement or generalized ML in the older pts. and the Israel- and European-born. Abdominal (g.i.) ML predominated in the African-born and Arabs (67.3% and 78.6% of the focal ML, resp.) and in the younger pts. The major site of abdominal ML was the small intestine in younger pts., the African-born and the Arabs; in older pts., the predominant abdominal ML involved the stomach. Nasopharyngeal and tonsillar ML accounted for about 20% of non-abdominal focal ML in Europeans and Asians and about 10% in the Arabs and African-born.

See also abstract nos.: 905,913,921,927,929,959,973,1054

69-1109 CHROMOSOMES OF NORMAL AND NEOPLASTIC OVARIAN TISSUE. (E.) Toews, H. A. (Johns Hopkins U. Sch. Med., Baltimore, Md.), K. P. Katayama and H. W. Jones, Jr. Obstet. Gynec. 32(4):465-476, 1968.

The karyotype of 1 dermoid ovarian cyst was normal; most cells of a malignant teratoma (from a child) were diploid. Examination of cells from 5 primary tumors (2 undifferentiated adenocarcinomas, 2 papillary cystadenocarcinomas, 1 dysgerminoma) and 1 metastatic adenocarcinoma of the ovary showed a wide range of abnormal karyotypes. The 2 fairly well-differentiated adenocarcinomas showed a hyperdiploid mode with a few tetraploid or hypertetraploid cells; 1/2 had marker chromosomes and the other had a small number of diploid cells. The other 4 tumors were less differentiated and showed karyotypes ranging from hypo- to hypertriploid; all showed markers and 3 showed secondary modes of a higher ploidy. The dysgerminoma cells also showed sex chromatin particles.

69-1110 SEX CHROMATIN PATTERN IN HYDATIDIFORM MOLE. (E.) Baggish, M. S. (Johns Hopkins U. Sch. Med., Baltimore, Md.), J. D. Woodruff, S. H. Tow and H. W. Jones, Jr. Amer. J. Obstet. Gynec. 102(3):362-370, 1968.

Well-defined sex chromatin bodies were seen in all sections of 90/90 hydatidiform moles; only 11/90 tumors (12%) had 15% or less sex chromatin-positive cells, while 65/90 (72%) had 20% or more positive cells. It is suggested that the hydatidiform mole contains 2 cell lines, 1 from the union of the sperm and ovum, the other developing from endoreduplication of the second polar cell.

69-1111 THE VALUE OF THE ASSAY OF CHROMOSOMES IN THE DIAGNOSIS OF CERVICAL NEOPLASIA. (E.) Jones, H. W., Jr. (Johns Hopkins U. Sch. Med., Baltimore, Md.), H. J. Davis, J. K. Frost, I. Park, R. Salimi, P. Tseng and J. D. Woodruff. Amer. J. Obstet. Gynec. 102(5):624-641, 1968.

In squash preparations of cervical epithelium from 25 pts. with normal or nearly normal cervical histology, mitotic figures were rare and all of these were diploid. Aneuploidy was seen in preparations from 8/21 pts. with cervical atypia and 5/6 pts. with intraepithelial (Stage 0) carcinoma; the karyotypes were within the tetraploid range in 4/8 and 3/5, resp. The histological diagnosis at the time the squash preparations were made was focal lesions, Stage 0 or focal lesions with neoplasia in 2/8 and 3/8, resp., with cervical atypia; later histological examination of biopsy, conization or hysterectomy specimens showed Stage 0 lesions in 4/8. It is suggested that aneuploid cells from a focus of cervical atypia are malignant.

69-1112 CHROMOSOMES OF BENIGN AND MALIGNANT LESIONS OF THE BREAST. (E.) Toews, H. A. (U. Manitoba, Winnipeg, Canada), K. P. Katayama, T. Masukawa and E. F. Lewison. Cancer 22(6):1296-1307, 1968.

Normal diploid karyotypes were seen in biopsy specimens and nipple secretions from 4/4 pts. with benign cystic hyperplasia of the breast. In 1/2 with lobular breast carcinoma *in situ*, the 7 cells examined had 46 chromosomes (with a normal diploid karyotype in 2/2 cells studied further); in 1/2, 2/6 cells had 47 chromosomes and the other 4 cells had 46 chromosomes (with several breaks in 1/4). Biopsy specimens from these 2 pts. contained both normal and tumor cells. Examination of specimens from 8 pts. with invasive carcinoma showed 2 karyotypes in the diploid range, 5 in the triploid range (karyotypes in the pentaploid range were also seen in 2/5) and 1 with a pentaploid mode. Rapid tumor growth was associated with pentaploidy and large proportions of cells with markers, rings, breaks and multiradial forms.

69-1113 CHROMOSOMES AND CAUSATION OF HUMAN CANCER AND LEUKEMIA. V. KARYOTYPIC ASPECTS OF ACUTE LEUKEMIA. (E.) Sandberg, A. A. (Roswell Park Mem. Inst., Buffalo, N. Y.), N. Takagi, T. Sofuni and L. H. Crosswhite. Cancer 22(6):1268-1282, 1968.

Bone marrow cells from 219 pts. with acute myeloblastic (AML; 113/219) or lymphoblastic (ALL; 106/219) leukemia were examined. Aneuploidy was seen in 50% of the pts., with wide individual variations in karyotype and no consistent or characteristic chromosomal changes (except for a small number of pts. with Group C trisomy). In AML, abnormal karyotypes ranged from hypodiploid to hyperdiploid; abnormal karyotypes in ALL were hyperdiploid, with no obvious cases of hypodiploidy. Pseudodiploid karyotypes were seen in 8 pts. with AML and 1 with ALL. Marker chromosomes were seen in 40% of the pts. showing aneuploidy and an unspecified number of pts. with diploid cells. No single chromosome group could be implicated more than another in the karyotypic changes of acute leukemia. Abnormal karyotypes remained the same from 1 stage of the disease to another (with 1 possible exception in a pt. with ALL). The large proportion of pts. with diploid leukemic cells and the marked individual variations in aneuploid karyotype suggested that chromosomal changes were secondary to the leukemic state and affected by the variable genotypes of the pts.

69-1114 CHROMOSOME STUDIES ON CULTURED LYMPHOBLAST CELL LINES FROM CASES OF NEW GUINEA BURKITT LYMPHOMA, MYELOBLASTIC AND

YMPHOBLASTIC LEUKAEMIA AND INFECTIOUS MONONUCLEO-
IS. (E.) Tomkins, G. A. (Commonwealth Ser.
abs., Parkville, Australia). Int. J. Cancer
(5):644-653, 1968.

xamination of 8 lymphoblast cell lines from 3
emale pts. with infectious mononucleosis, 2 fe-
ale pts. with acute myeloblastic or lymphoblastic
eukemia and 2 male pts. with Burkitt lymphoma (2
urkitt lymphoma cell lines were from the same
t.) showed diploid or nearly diploid karyotypes
n all cell lines; however, 7/8 strains also con-
ained pseudodiploid cells, the exception being
he lymphoblastic leukemia cells. Abnormalities
ssociated with chromosome groups A, C and/or G
ere seen in all cell lines. The Burkitt lymphoma
ells showed a wider range of chromosome numbers
han the other cell lines. No single chromosome
bnormality could definitely be assigned to the
pecific origin of the cell line.

9-1115 CHROMOSOMAL ALTERATION AND DEVELOPMENT
OF TUMORS. XIX. CHROMOSOME CONSTITU-
ION OF TUMOR CELLS IN 16 PLASMA CELL NEOPLASMS
F BALB/c MICE. (E.) Yosida, T. H. (Nat. Inst.
enetics, Misima, Japan), H. T. Imai and M. Potter.
. Nat. Cancer Inst. 41(5):1083-1097, 1968.

aryotypes and immunoglobulin patterns were stud-
ed in 16 plasma cell tumors induced in BALB/c
ice by mineral oil (including mineral oil adju-
ants). The karyotype was hypotetraploid in 13/16
nd hypertetraploid, hyperdiploid and hypotriploid
n 1/16 each; 13 tumors showed 1-4 marker chromo-
omes and 13 tumors produced specific immunoglobu-
ins. The modal chromosome number and the wide
ange of chromosome number decreased with the
umber of transplant generations. The patterns
f immunoglobulin production and/or the marker
hromosome complements changed with time in 4
tumors. In these tumors, the modal chromosome
umber after 61-82 passages (3/4; in 1/4 the num-
er of passages was unknown) reverted towards the
values seen in earlier passages. One of these
tumors showed unchanged immunoglobulin production,
but 2 marker chromosomes appeared for the first
time. In the other 3 tumors, immunoglobulin pro-
duction disappeared and additional marker chromo-
somes appeared; the number of markers increased
from 1 to 4 in 1/3, from 3 to 4 in 1/3 and from
0 to 3 in 1/3 tumors.

69-1116 SULPHOGLYCOPROTEIN ANTIGENS IN THE HUMAN ALIMENTARY CANAL AND GASTRIC CANCER. AN IMMUNOHISTOLOGICAL STUDY. (E.) Häkkinen, I. (U. Turku, Finland), O. Järvi and J. Grönroos. Int. J. Cancer 3(5):572-581, 1968.

Immunofluorescence tests using rabbit antisera to sulfoglycoproteins (SGP) from the gastric juice of normal subjects and pts. with benign intestinal metaplasia of the gastric epithelium or with stomach cancer, detected 3 types of SGP of different antigenicity in gastric specimens from 29 pts. with peptic ulcer and stomach cancer. Immunofluorescence patterns with the cancer antiserum were negative in 25/29 specimens from ulcer pts., but 4/29 showed fluorescence in morphologically normal superficial antral cells. Specimens from 22/25 pts. with stomach cancer showed several distinct patterns of immunofluorescence in response to the cancer antiserum: 3/25 were negative with all antisera; 15/25 showed fluorescence of the cancer cells only (5/15 specimens contained normal and cancer tissue, but only the tumor cells reacted to this antiserum); 7/25 showed fluorescence of both the cancer cells and some of the morphologically normal superficial epithelial cells. The "cancer" antigen (designated as the "fetal" antigen) apparently developed in the superficial mucosa of the fetal g.i. tract from the stomach to the colon, but disappeared some time after birth. Its reappearance was apparently unrelated to the presence of the "intestinal" antigen in the stomach. It is suggested that the morphologically normal superficial cells synthesizing this antigen (in 4/29 ulcer and 7/25 cancer specimens) may have been functionally very primitive cell clones, but whether these cells were cancer precursors could not be determined.

69-1117 DIFFUSE CONDITIONS OF THE LARGE BOWEL WHICH ARE PREMALIGNANT. (E.) Lockhart-Mummery, H. E. (St. Mark's Hosp., London). Brit. J. Surg. 55(10):735-738, 1968.

Colectomy and ileorectal anastomosis (preserving the rectal stump) were performed in 72 pts. with adenomatous polyposis from 1945-1968. The age at diagnosis was 12-13 yr. in 71/72 and 9 yr. in 1/72. Of the 71 pts. surviving the initial procedure, 3 later developed rectal tumors which were excised (premalignant polyposis after 10 yr. in 1/3; rectal carcinoma after 2-6 yr. in 2/3), 1 died after 2 yr. of recurrent intestinal carcinoma, 1 died after 6 yr. with a melanoma of the eye, 1 died after 14 yr. with leukemia and 2 pts. died of other causes after 7 mo.-3 yr. Careful follow-up examination of the rectal stump and removal or destruction of any rectal polyps are emphasized. The risks of malignant transformation of ulcerative colitis and multiple polyps are also discussed.

69-1118 SOLITARY POLYPOIDAL LESIONS WHICH ARE PREMALIGNANT IN THE LARGE INTESTINE. (E.) Goligher, J. C. (Gen. Infirmary, Leeds, England). Brit. J. Surg. 55(10):738-742, 1968.

The surgical treatment of solitary adenomas or papillomas of the colon and rectum (the extent of surgery depending on the histological diagnosis of benign or malignant lesions) is discussed.

69-1119 ADRENAL FUNCTION IN BREAST CANCER: PRODUCTION AND METABOLIC CLEARANCE RATE OF CORTISOL IN PATIENTS WITH EARLY OR

ADVANCED BREAST CANCER AND IN NORMAL WOMEN. (E.) Jensen, V. (Imp. Cancer Res. Fund, London), N. Deshpande, R. D. Bulbrook and T. W. Doouss. J. Endocr. 42(3):425-432, 1968.

The metabolism of ^{14}C-labeled hydrocortisone (H; cortisol) was studied in 17 women with early (8) or advanced (9) breast cancer (mean ages 54 and 59 yr., resp.) and 6 women of the same ages without cancer. The miscible pool of H was increased in advanced cancer because of a higher H production rate. Since plasma H clearance remained unchanged, the titer of both total and unbound H was increased in advanced cancer. No significant changes in H production rates were seen in the pts. with early cancer. Studies of H binding to transcortin showed an increase in unbound H in advanced cancer; the significant correlation between H production and both total and unbound H suggested that liver extraction of H (another experiment identified this fraction as unbound H) remained normal.

69-1120 THE BASIS OF THE TUMORIGENICITY OF BHK 21 CELLS. (E.) Jarrett, O. (U. Glasgow, Scotland) and I. MacPherson. Int. J. Cancer 3(5):654-662, 1968.

The tumor-inducing properties of several lines of the BHK 21/13 clone (fibroblasts derived from newborn hamster kidney) were studied in several experiments in hamsters. BHK 21/13 cells, about 50 generations after cloning (designated C 13-50), contained a small proportion of tumor-inducing cells (about 0.001%) which produced tumors with high efficiency in repeat transplantation studies. Non-tumor-inducing cells were easily isolated from these stocks by further cloning. The increase in the proportion of tumor-inducing variant cells (to over 90% after repeated in vitro passage) was attributed to any or all of 3 situations: the appearance of many new, different tumor-inducing variants; selection of the initially observed variant cells by their greater capacity for growth in vitro; or an infection-like transmission of a replicating agent from the variant cells to formerly non-tumor-inducing cells. Since polyoma virus did not selectively transform these variant cells, it is concluded that the tumor-inducing activity of the polyoma-transformed BHK 21/13 cells (in the early passages) results from a virus-cell interaction.

69-1121 SOME ULTRASTRUCTURAL FEATURES OF YOSHIDA ASCITES HEPATOMA. (E.) Locker, J. (U. Pittsburgh Sch. Med., Pa.), P. J. Goldblatt and J. Leighton. Cancer Res. 28(10):2039-2050, 1968.

The ultrastructure of Yoshida ascites hepatoma #7974 (derived from a dimethylaminoazobenzene-induced hepatoma) transplanted into JR rats was studied 7-17 days after tumor inoc. The 7-9-day-old cells showed a uniform morphology, with dispersed ribosomes, an unusual configuration of the endoplasmic reticulum and annulate lamellae. The longest observed survival time (17 days) was accompanied by morphological changes indicating very active tumor growth: about 10% of the tumor cells were in mitosis (sometimes abnormal), the ribosomes were aggregated and at least 1 centriole showed an abnormal number of filaments in the radial subunits. Numerous virus-like particles (budding from the plasma membrane and in the intercellular spaces) were also noted.

69-1122 TRANSPLANTABLE CHONDROSARCOMA IN THE SYRIAN HAMSTER (Mesocricetus auratus). (E.) Taylor, D. O. N. (California State Dept. Pub. Health, Berkeley). Cancer Res. 28(10):2051-2055, 1968.

A spontaneous chondrosarcoma of the humerus, developing in a 6-mo.-old Syrian hamster, was transplanted by cheek pouch inoc. in cortisone-treated animals for 2 passages, followed by 17 s.c. passages over the next 3.5 yr. in unconditioned animals. Cell-free filtrates of this tumor did not induce tumors in newborn hamsters. No significant titers were seen in the sera of hamsters tested for antibodies against polyoma virus or the tumor antigens related to SV40 or adenovirus strains 12 and 18.

69-1123 CLINICAL PROBLEMS IN THE DEVELOPMENT OF CARCINOMA IN FOCI OF OSTEOMYELITIS. (Ger.) Popkirov, S. (N.I. Pirogov Med. Inst., Sofia). Bruns. Beitr. Klin. Chir. 216(6):537-544, 1968.

Ten men (age 38-65 yr.) with long histories of osteomyelitis (over 30 yr. in 7/10, 6-20 yr. in 3/10) and fistula formation (duration 4-13 yr. in 5/10, 17-26 yr. in 5/10) complicated by carcinoma are described. In most pts. the bacterial flora were mixed. All tumors were carcinomas (undetermined type 1/10; spinal cell 6/10, squamous cell 3/10; keratotic in 4/10), arising from the epithelial tissues of the fistulas and spreading to the bones and surrounding soft tissues. No primary bone tumors were seen. It is concluded that malignant degeneration is a consequence of inadequate treatment of osteomyelitis, and that each neglected, fistulated osteomyelitis lesion should be considered a potential carcinoma. Early diagnosis is rarely possible since tumor formation is secondary to an existing disease.

69-1124 OSTEITIS DEFORMANS (PAGET'S DISEASE) WITH MALIGNANT TRANSFORMATION. (Ger.) Fölsch, E. Langenbeck. Arch. Klin. Chir. 321(4):359-369, 1968.

A 62-yr.-old man with Paget's disease of 20 yr. duration involving the right calcaneus (a rare localization) and other bones, was admitted with possible malignant transformation of the calcaneus lesion several mo. after unsuccessful X-ray

eatment (1350 r) for localized pain and swell-
g. The serum alkaline phosphatase (AP) was
0 U (Huggins and Talalay; normal, 10 U), about
fold higher than the values seen in Paget's
sease. After amputation, serum AP fell to 76
The histological diagnosis was osteogenic
d osteolytic polymorphocellular sarcoma local-
ed to the calcaneus; no metastases were noted.
e reported incidence of sarcomatous transforma-
on of osteitis deformans is about 2%; this pt.
unusual in having a 20-yr. history of Paget's
sease before developing the tumor (in other
ported cases it was about 3 yr.). It is con-
uded that an abrupt increase in serum AP in
get's disease may indicate malignant transforma-
on.

9-1125 DIAGNOSTIC VALUE OF LEUKOCYTE ALKALINE
PHOSPHATASE IN OSTEOMYELOFIBROSIS AND
STEOMYELOSCLEROSIS. (Ger.) Nowotny, P. (U.
ed. Clin., Rostock, Germany) and K. Schulz.
olia Haemat. (Leipzig) 90(1):40-54, 1968.

lkaline phosphatase (AP) values in the peripheral
3C of 37 adults with idiopathic osteomyelofibro-
is (OMF; 19) or osteomyelosclerosis (OMS; 18)
ere elevated in 9/37, normal in 15/37 and reduced
to about the same levels as in chronic myeloid
eukemia) in 13/37. No age or sex differences
WBC AP levels were noted, and the changes (if
any) in AP values with the clinical and hematological pictures were not always consistent; in 1 pt., low AP values rose to the normal range at the time of transformation of OMS to paramyeloblastic leukemia. In most pts., bacterial endotoxin stimulation tests demonstrated a true AP defect. It is concluded that lowered WBC AP levels in pts. with suspected myeloid leukemia do not exclude the possibility of OMF or OMS, and that bone marrow biopsy is necessary for the final diagnosis.

69-1126 FAMILIAL CHRONIC LYMPHATIC LEUKEMIA ASSOCIATED WITH SKIN CARCINOMA. (It.) Magaraggia, Di L. (City Hosp., Vicenza, Italy) and G. Vettori. Fracastoro 61(3):269-273, 1968.

Two brothers who developed chronic lymphatic leukemia (about 7 yr. apart), and later developed spinocellular carcinoma of the skin, are described. Both pts. were treated with chlorambucil and corticosteroids for leukemia. In 1/2 (59 yr. old at the diagnosis of leukemia), carcinoma of the cheek developed 8 yr. after the onset of leukemia and regressed in response to X-rays. In the other pt. (54 yr. old at the diagnosis of leukemia), carcinoma of the skin of 1 wrist developed 2 yr. after the onset of leukemia; this tumor did not respond to radiotherapy and amputation was later performed. There was no family history of malignant disease and no etiologic factor common to both brothers was noted (for example, neither brother smoked).

AUTHOR INDEX

hong, B. G. 1017
enis, L. 948
ler, A. 1064
bert, R. E. 936
-Saleem, T. 972
derson, L. J. 1070
drews, P. A. J. 922
ki, T. 1018,1019,1020
elrad, A. A. 1024

der, J. P. 1048
ggish, M. S. 1110
ldi, A. 920
lls, M. 908
ng, F. B. 1046
rski, G. 1037
rylko-Pikielna, N. 967,968
ttistini, V. 1073,1074
zan, O. I. 1082
ddow, T. G. 1002,1003
doya, V. 1060
nder, E. 1011
nn, M. 1012
nnett, M. 1025
nnington, J. L. 1089
ntvelzen, P. 1053
rezovskii, B. S. 935
rkmen, Y. M. 913
rman, L. 1036
rnard, C. 1034,1040
ielewicz, H. 1031
ierwolf, D. 1011
iggs, P. M. 1016,1017
iryulina, T. I. 1044
iskis, B. O. 931
itoon, M. 944
lair, C. D. 1032
lair, P. B. 1051
latt, E. S. 913
oggs, D. R. 1101
oiron, M. 1033,1034,1040
onneau, H. 995
orneff, J. 940
orsos, T. 1046
oyse, E. A. 900,901,1018, 1019,1020
radshaw, E. 1065
randt, R. B. 1012
ronk, B. V. 1104
ross, I. D. J. 974
routy-Boyé, D. 1036
rown, C. D. 925
ubenik, J. 1041
ulbrook, R. D. 1119
urger, M. M. 997
urnett, J. P. 999
urns, E. L. 1094,1095
urns, F. J. 936
uss, H. 957

Cameron, J. R. J. 918
Campbell, T. C. 987
Carol, W. 1091
Carter, S. B. 1106
Chakravorty, R. C. 929
Chamorro, A. 1022
Chervenick, P. A. 1101
Chu, E. W. 1004
Chuat, J. C. 1040
Churchill, A. E. 1015,1016,1017
Clapp, N. K. 976
Coates, H. 1046
Cocchi, R. 958
Cocchi Belisario, C. 958
Cochet, G. 995
Cohen, A. 1069
Connelly, R. R. 1080,1081
Conte, A. J. 950
Coppey, J. 1036
Coy, P. 1085
Craig, A. W. 976
Crighton, G. W. 1008,1009,1010
Crittenden, L. B. 1047
Crosswhite, L. H. 1113
Crozier, E. H. 1093
Cudkowicz, G. 1025

Dalhamn, T. 969
Daniel, C. W. 1051
Davis, H. J. 1111
Dawson, P. J. 1023
Deckers, C. 939
Defendi, V. 1057
Demaille, A. 948
DeOme, K. B. 1051
Depaoli, M. 920
Deshpande, N. 1119
De Somer, P. 1001
De-Thé, G. 1036
Detroux, J. 930
Dienes, G. J. 1104
Doouss, T. W. 1119
Driessens, J. 948
Duesberg, P. H. 1032
Dutta-Choudhuri, R. 929

Easterday, C. L. 1099
Eddy, B. E. 1004
Edfors, M.-L. 969
Eisenberg, H. S. 1081,1098
Elveback, L. R. 1071
Embil, J. A., Jr. 1005
Engel, C. R. 938
Epstein, M. A. 1017
Epstein, W. L. 1012
Estefan, R. M. 966
Evans, J. 994

Fahey, J. L. 1056
Falcoff, E. 1036
Farrell, R. L. 1063
Faulkin, L. J., Jr. 1051
Fefer, A. 1039
Ferguson, B. R. 1089
Fieldsteel, A. H. 1023
Finegold, I. 1056
Finkel, M. P. 931
Fleming, W. B. 1084
Foard, M. 1046
Fölsch, E. 1124
Fraumeni, J. F., Jr. 975
Freeman, A. E. 1000
Freeman, A. I. 1062
Friedman, M. A. 988
Friend, C. 1026
Friskey, R. W. 1077
Frost, J. K. 1111
Fugmann, R. A. 1050
Fukuyama, K. 1012

Gabay, J. J. 925
Gagna, C. 1073,1074
Galibert, F. 1033
Ganote, C. E. 983
Gates, O. 932,933
Gause, E. M. 966
Gayraud, J. 1066
Geering, G. 901
Geraldes, A. 1034
Gibson, S. R. 905
Gilbert, D. A. 1105
Gilden, R. V. 1000,1002, 1003
Glynn, J. P. 1039
Goldblatt, P. J. 1121
Goldman, B. 1108
Goligher, J. C. 1118
Goodner, J. T. 1079
Gorski, T. W. 1095
Graffi, A. 1011
Graffi, I. 1011
Grantham, P. H. 939
Green, S. 985
Gresser, I. 1036
Griesemer, R. A. 1063, 1064
Grimley, P. M. 1060
Grönroos, J. 1116
Grossi, C. E. 950
Grzybowski, S. 1085
Gubareva, A. V. 934
Guillemain, B. 1040
Gupta, P. 1092
Gurski, T. 937
Gusek, W. 957

Haber, S. L. 1089
Hakim, S. A. E. 959
Häkkinen, I. 1116
Hammond, E. C. 963,1094, 1095
Hampe, A. 1033
Hanche-Olsen, A. 1088
Hardy, E. P., Jr. 924
Hare, W. C. D. 1014

Harłozińska, A. 904
Harrington, J. A. 999
Hay, D. 1009,1010
Heimbach, R. D. 936
Hertig, A. T. 1099
Hess, P. 919
Higgins, P. McR. 962
Higgins, T. P. 950
Hiraki, K. 1035
Hirshaut, Y. 1056
Hlavay, E. 1043
Homburger, F. 907
Horn, K.-H. 1011
Houston, W. 1087
Huebner, R. J. 1000,1002,1003
Huggins, C. 954
Hulme, G. W. 1098
Humphrey, E. W. 1083
Huppert, J. 1037
Huseby, R. A. 955
Hyams, L. 1076

Iaskovets, A. A. 945
Ide, G. 965
Imagawa, D. T. 1021
Imai, H. T. 1115
Innis, M. D. 1054
Inui, N. 980
Irino, S. 1035
Ishibe, T. 956
Issa, H. 1021

Jacob, J. 991
Jacobs, B. B. 955
Jarrett, O. 1008,1009,1010,
1120
Jarrett, W. F. H. 1008,1009
Järvi, O. 1116
Jensen, V. 1119
Jim, R. T. S. 1072
Johnson, L. D. 1099
Johnson, W. W. 1062
Jones, H. W., Jr. 1109,1110,
1111
Jones, J. B. 941
Jull, J. W. 946

Kakunaga, T. 943
Kamahora, J. 943
Kaminetzky, H. A. 952
Katagiri, M. 1027
Katayama, K. P. 1109,1112
Katsuki, H. 965
Kaufman, S. 1048
Kern, J. 1000,1002,1003
Keston, A. S. 1012
Khundanova, L. L. 979
Kikuchi, Y. 951
Killmann, S.-A. 1102,1103
Kinnman, J. 921
Kitamura, H. 1058
Kobayashi, N. 965
Korosteleva, T. A. 977
Krush, A. J. 910
Kryukova, I. N. 1044
Kshivan'ska, E. 937
Kuff, E. L. 1013
Kunte, H. 940
Kurland, L. T. 1071
Kuroda, Y. 1049
Kuschner, M. 964
Kyle, R. A. 1071

Laird, H. M. 1008,1009,1010
Laskin, S. 964
Laurent, Y. 930
Lebrun, J. 930
Lee, C. W. 982
Lefkowitz, S. S. 1006
Legerlotz, C. 1097
Leighton, J. 1121
Levy, J. A. 1057
Lewis, A. M., Jr. 902
Lewison, E. F. 1112
Li, C. P. 1004
Lin, P. 1014
Little, J. B. 928
Lloyd, B. J., Jr. 1038
Locker, J. 1121
Lockhart-Mummery, H. E. 1117
Lucis, O. J. 1005
Lucis, R. 1005
Lueders, K. K. 1013
Lynch, H. T. 910

MacPherson, I. 1120
Magaraggia, D. L. 1126
Malmgren, R. A. 1061
Mardjono, M. 1068
Markam, S. 1068
Marsh, M. F. 910
Martin, C. E. 1000
Martino, E. C. 1004
Masukawa, T. 1112
Mathot, C. 1028
Maximos, A. 940
McAllister, R. C. 1000
McCoy, J. L. 1039
McFarlane, E. S. 1005
McGandy, R. B. 928
McGlashan, N. D. 960
McLean, A. E. M. 960
McQuarrie, D. G. 1083
Mellors, R. C. 899
Merkow, L. 1007
Metzgar, R. S. 998
Meurman, L. O. 915
Meyer, G. 995
Michaels, L. 922
Mirand, E. A. 1025
Miyaki, K. 984
Miyata, H. 926
Miyoshi, I. 1035
Modan, B. 1069,1108
Modan, M. 1108
Mohr, U. 911
Moldow, R. E. 1080
Montalvo, D. A. 966
Moore, G. E. 1058
Morton, D. L. 1061
Moutaffian, M. 995
Müller, W. 1091
Murphy, E. D. 953

Nakai, M. 1021
Nandi, S. 1052
Nickerson, R. J. 1099
Nicoloff, D. M. 1083
Nobrega, F. T. 1071
Norris, C. M. 972
Nowotny, P. 1125
Noyes, W. F. 992

Oboshi, S. 1027
O'Brien, P. A. 1031
Obuch, I. B. 1044
Oettgen, H. F. 901
Okano, T. 989
Old, L. J. 900,901,1018,
1019,1020
Oleinick, A. 1107
Oleinick, S. R. 998
Olson, C. 993
Ornowski, S. 970

Palekar, L. 964
Pangborn, R. M. 967,968
Pardo, M. 1007
Park, I. 1111
Park, W. D. 962
Paskin, A. 1104
Peale, A. R. 972
Peraudeau, L. 1033
Percy, C. 1094,1095
Peries, J. 1034,1040
Perk, K. 1038,1039
Petrun, A. S. 978
Phelan, J. T. 1090
Pineda, A. 1096
Plowman, K. M. 987
Poliak, N. R. 949
Popkirov, S. 1123
Porter, I. H. 925
Portman, R. S. 987
Potter, M. 1115
Prato, V. 1073,1074
Prescott, B. 1004
Pretorius, H. E. 986
Priore, R. L. 974
Purchase, I. F. H. 986

Rabinowitz, Z. 996
Rabson, A. S. 1060
Radzichovskaja, R. 1045
Rao, K. 1083
Rapoza, N. P. 1007
Rauscher, F. J., Jr. 1055
Raven, R. W. 906
Raychaudhuri, S. P. 990

ddick, R. A. 1006
uber, M. D. 982
odes, A. J. 916
ley, P. A. 942
tter, R. I. 1052
vera, J. 924
bertson, J. H. 1093
bl, M. G. 993
senkranz, H. S. 944
senthal, A. S. 983
sillon, J. 930
ssi, G. B. 1026
usselot, L. M. 950
we, J. F. 1085
we, W. P. 902
wlands, J. R. 966
ben, L. N. 908
benchik, B. L. 978
ssell, L. B. 1025
lander, R. 969

chs, L. 996
limi, R. 1111
ll, S. 1096
machson, J. 924
maille, J. 1001
ndberg, A. A. 1113
ndison, A. T. 1070
saki, M. S. 926
wicki, E. 938
hade, R. O. K. 961
her, S. 1028
hievelbein, H. 914
hiffer, L. M. 1100
hmidt, R. M. 944
honland, M. 1065
hramm, T. 1011
hulz, K. 1125
eal, P. 942
edlis, A. 1096
eidel, H. J. 981
eidman, H. 1094,1095
eido, T. 1027
ekula, J. 971
eland, P. 1088
elenka, F. 940
elikoff, I. J. 963
eman, C. 1059
eman, G. 1059
hani, M. 1108
hannon, I. L. 967

Shapiro, B. Ia. 1082
Shedd, D. P. 1081
Shibley, G. P. 1031
Shigeno, N. 900
Shimizu, K. 927
Shimkin, M. B. 917
Shin, H. I. 921
Sigel, M. M. 1050
Sims, H. 1038
Slifkin, M. 1007
Slowinski, E. J. 910
Smith, P. G. 962
Sofuni, T. 1113
Solomon, H. A. 974
Spencer, H. 924
Steck, T. L. 1048
Steeves, R. A. 1025
Stephens, R. 1031
Stelmachowska, A. 904
Stetson, C. A. 903
Steyn, M. 986
Stockert, E. 900
Stone, M. L. 1096
Stuart, R. S. 1099
Stüper, P. 1097
Supeno, S. 1068
Svec, F. 1043
Svec, J. 1043
Swerdlow, M. 952
Swinney, J. 961
Szydłowska, H. 1067

Tacke, R. B. 1023
Takagi, N. 1113
Takayama, S. 980
Takeda, K. 951
Takei, K. 1078
Taylor, D. O. N. 1122
Temin, H. M. 1042
Terao, K. 984
Thomas, M. 1034
Thomson, S. 1024
Thorne, H. V. 994
Toews, H. A. 1109,1112
Tomkins, G. A. 1114
Toshima, S. 1058
Tow, S. H. 1110
Toya, R. E., Sr. 976
Triolo, V. A. 917
Tseng, P. 1111
Tsigelnik, A. Ia. 1082
Tsubota, T. 1035
Tsuji, K. 989
Turano, A. 1041
Turnbull, A. D. M. 1079
Turner, H. C. 1000

Ueda, T. 951
Uematsu, K. 954
Uslenghi, E. 1073,1074

Vandeputte, M. 1001
Van Nostrand, D. 1083
Van Rooyen, C. E. 916
Verma, V. S. 990
Vernick, S. H. 1038
Vettori, G. 1126
Virag, I. 1108
Virolainen, M. 1057
Von Essen, C. F. 1081
Vysheslavova, M. Ia. 947

Wahi, P. N. 973
Wahren, B. 1029,1030
Wallach, D. F. H. 909
Walters, C. L. 960
Warden, D. 994
Warren, S. 932,933
Wattré, P. 1001
Weisburger, J. H. 939
Wetteland, P. 921
Wivel, N. A. 1013
Wogan, G. N. 988
Wolfe, L. G. 1063,1064
Woodruff, J. D. 1110,1111
Woyke, S. 1075
Wright, B. S. 1031
Wright, H. B. 1086
Wynder, E. L. 1076

Yamagata, N. 923
Yamane, Y. 965
Yamawaki, S. 951
Yasuhira, K. 912
Yoshiki, T. 951
Yosida, T. H. 1115
Youn, J. K. 1037
Young, J. M. 941
Young, J. T. 1051

Zachariasewycz, E. 1014
Zasypka, A. T. 977

SUBJECT INDEX

ADRENAL CORTEX
- dimethylbenzanthracene necrosis, effect of Metopirone, rat: 946
- function, breast cancer: 1119

ADRENAL NEOPLASMS
- epidemiology, cattle, sheep and swine, Britain: 1070
- pheochromocytoma, epidemiology, cattle, sheep and swine, Britain: 1070

AFLATOXIN(S)
- effect on DNA, RNA and protein, chick embryo liver: 984
- synthesis, *Aspergillus*-contaminated plant substrates: 986

AFLATOXIN B_1
- antitumor effects, rat hepatoma: 985
- effect on liver enzyme induction, rat: 988
- metabolism, liver, species differences (mouse and rat): 987

AIR
- ^{137}Cs fallout, blood ^{137}Cs distribution, geographical variations: 923
- pressure, nasopharynx cancer, pilots of non-pressurized airplanes: 922

AIR POLUTION
- carcinogens, analysis, method: 938
- lung cancer, Canada (immigrants or native-born): 1895

ALCOHOL
- beverages, nitrosamine content, Africa (Zambia): 960

ALCOHOL CONSUMPTION
- esophagus cancer, Natal Africans: 1065
- mouth cancer, India: 973

ALUMINUM COMPOUNDS
- effect on nitroquinoline oxide lung tumors, mouse: 965

ANDROGENS (See under Hormones)

ANISOLE DERIVATIVES
- premalignant skin lesions, guinea pig: 942

ANTHRANILIC ACID 3-HYDROXY-
- as tissue hapten, mouse: 977

ANTITUMOR AGENTS
- RNA-inhibiting, comparison with aflatoxin, chick embryo liver cells: 984

ASBESTOS
- environmental, pleural calcification and mesothelioma, review: 915
- occupational exposure
  - lung cancer, and smoking: 963
  - peritoneal mesothelioma: 962
  - pleural calcification and mesothelioma, review: 915

AZOBENZENE, p-DIMETHYLAMINO-
- liver antigens, rat: 979
- liver tumors, glycolysis and associated enzymes, rat: 978

AZOXYMETHANOL, METHYL- (See Cycasin aglycone)

BACTERIA
- effect of nitroso compounds: 944

BENZ(c)ACRIDINE
- bladder tumors, rat: 959
- isolation, edible oil, plants of poppy-fumaria group: 959
- skin tumors, mouse: 959

1,2-BENZANTHRACENE
- effect on trachea *in vitro*, rat: 964

BENZANTHRACENE, 7,12-DIMETHYL-
- adrenal necrosis, effect of Metopirone, rat: 946
- effect on mitosis, normal and tumor cells: 945
  - serum oncolytic activity, tumor-bearing rat: 949
- leukemia, mouse: 954
- ovarian tumors, mouse: 954

BENZANTHRACENE, 7,8,12-TRIMETHYL-
- leukemia, mouse: 954
- ovarian tumors, mouse: 954
- toxicity, rat: 954

7H-BENZ(de)ANTHRACEN-7-ONE
- air pollution, analysis, method: 938

3,4-BENZPYRENE
- leukemia, mouse: 954

BIPHENYL, 3:2'-DIMETHYL-4-AMINO-, HCl
- intestinal tumors, rat: 950

BLADDER CARCINOGENESIS
- benz(c)acridine, rat: 959
- occupational, diagnosis: 961

BLADDER NEOPLASMS
- smoking, review: 914
  - and urbanization, U.S.: 975

BLOOD
- hemoglobin, effect of tobacco smoke, animal: 966
- proteins, carcinogen distribution, rat: 939
- RBC, mammary tumor virus bioassay, mouse: 1052

BLOOD GROUPS
- ABO, cervix cancer: 1092

BONE DISEASES
- fistulated osteomyelitis, transformation to carcinoma: 1123

BONE MARROW DISEASES, NON-MALIGNANT (See also under Leukemia)
- osteomyelofibrosis or osteomyelosclerosis, differential diagnosis, WBC enzymes: 1125

BONE NEOPLASMS
- osteosarcoma
  - antibody formation to possible virus, human: 1061
  - radiation-induced, child: 930
    - virus isolation, mouse: 931
- radiation-induced, species difference, rodent: 933
- sarcoma, from osteitis deformans (Paget's disease), diagnosis, serum enzymes: 1124

BRAIN NEOPLASMS
- epidemiology, Israel: 1069
- glioma, distribution (cerebral cortex), glial cell distribution: 1067
- SV20-induced, pathology and ultrastructure, hamster: 1007

BREAST NEOPLASMS (See Mammary neoplasms, human)

SUBJECT INDEX

- RONCHUS
  - pathology, smokers: 970
- ADMIUM CHLORIDE
  - testis tumors, enzymes, mouse: 956
- ARBON TETRACHLORIDE
  - toxicity, liver, rat: 983
- ARCINOGENESIS
  - mechanism, and cell membranes, review: 909
- ARCINOGENESIS, CHEMICAL
  - hamster, review: 907
  - historical review: 917
  - immunology, review: 901
- ARCINOGENS, CHEMICAL
  - occupational exposure, bladder cancer: 961
- ELL GROWTH KINETICS
  - acute leukemia, mechanism, review: 1002,1003
  - cell membranes and malignant transformation, mechanism, review: 909
  - chronic lymphatic leukemia: 1100
    - myeloid leukemia, mechanism, review: 1101
  - mathematical model: 1104,1105,1106
- ERVIX UTERI NEOPLASMS
  - blood groups (ABO): 1092
  - dysplasia and carcinoma *in situ*, malignant transformation: 1099
  - epidemiology
    - Connecticut: 1098
    - high- and low-risk groups: 1094
    - methods: 1097
    - New York City: 1096
    - Northern Ireland: 1093
    - Ohio (Toledo): 1095
  - HeLa cells, selective aggregate formation with chick embryo cells *in vitro*: 1049
  - induction, methylcholanthrene, effect of oophorectomy, mouse: 953
  - karyotype: 1111
  - premalignant, methylcholanthrene + estrogen, monkey: 952
- CHROMOSOMES
  - acute leukemia: 1113
    - cell lines: 1114
  - bovine lymphosarcoma cell lines: 1014
  - breast cancer (benign or malignant): 1112
  - Burkitt lymphoma cell lines: 1114
  - cervix cancer: 1111
  - immunoglobulin-producing plasma cell tumors, mouse: 1115
  - ovary tumors: 1109
  - sex, hydatidiform mole: 1110
  - WBC, Hiroshima survivors: 926
    - occupational radium exposure: 925
- COLON NEOPLASMS
  - hereditary, review: 910
  - premalignant or malignant, diagnosis and treatment: 1118
- CONNECTIVE TISSUE NEOPLASMS
  - rhabdomyosarcoma, child, ultrastructure: 1062
  - skull, review: 913
- CORPUS UTERI NEOPLASMS
  - epidemiology
    - high- and low-risk groups: 1094
    - New York City: 1096
    - Ohio (Toledo): 1095
  - hydatidiform mole, sex chromatin: 1110
- CORTICOSTEROIDS (See under Hormones)
- CYCASIN
  - kidney tumors, pathogenesis, rat: 957
- CYCASIN AGLYCONE (methylazoxymethanol)
  - toxicity, liver, rat: 983

- EMBRYO
  - sea urchin, effect of nitroquinoline and nitroquinoline-1-oxide: 943
- ENDOCRINE ABLATION
  - oophorectomy, effect on methylcholanthrene cervix carcinogenesis, mouse: 953
- ENDOCRINE NEOPLASMS
  - epidemiology, cattle, sheep and swine, Britain: 1070
- ENDOMETRIUM NEOPLASMS
  - hereditary, review: 910
- ENVIRONMENTAL FACTORS
  - asbestos exposure, pleural calcification and mesothelioma, review: 915
  - urbanization, lung or urinary cancer and leukemia, smoking, U.S.: 975
- ENZYMES
  - alkaline phosphatase
    - serum, osteitis deformans (Paget's disease) with malignant transformation: 1124
    - WBC, myeloid leukemia and related diseases: 1125
  - CdCl$_2$-induced testis tumors, mouse: 956
  - glycolysis and gluconeogenesis, liver dimethylaminoazobenzene carcinogenesis, rat: 978
  - tryptophan pyrrolase and tyrosine transaminase, induction, effect of aflatoxin, rat liver: 988
- EPIDEMIOLOGY
  - all tumors
    - Natal Africans: 1065
    - New York City, and appendectomy: 1076
    - South Vietnam (Saigon): 1066
    - and tuberculosis, USSR (Leningrad): 1082
  - brain tumors, Israel: 1069
  - Burkitt's lymphoma, Poland (Szczecin): 1075
  - cervix cancer
    - Connecticut: 1098
    - high- and low-risk groups: 1094
    - methods: 1097
    - New York City: 1096
    - Northern Ireland: 1093
    - Ohio (Toledo): 1095
  - cervix dysplasia and carcinoma *in situ*, Boston: 1099
  - endocrine tumors, cattle, sheep and swine, Britain: 1070
  - esophagus cancer
    - carcinogen-contaminated foods: 959
    - Korea: 921
  - female genital cancer, Germany (Jena): 1091
  - g.i. cancer, Connecticut: 1080
  - Hodgkin's disease, review: 905
  - larynx cancer, Connecticut, smoking: 1081
  - leukemia
    - children, Australia, polio vaccination: 1054
    - Hawaii: 1072
    - Italy (Turin): 1073
    - Minnesota (Olmsted County): 1071

EPIDEMIOLOGY (Contd.)
- lung cancer
  - air pollution, Canada: 1085
  - Canada, immigrants or native-born: 1085
  - radiation exposure and smoking, Hiroshima: 927
  - smoking, Canada: 1085
    - Natal Africans: 1065
  - tuberculosis, USSR (Leningrad): 1082
- lymphoma
  - Israel: 1108
  - Italy (Turin): 1074
- mouth cancer
  - alcohol consumption, India: 973
  - smoking, Australia (Victoria): 1084
    - India: 973
  - tobacco chewing, India: 973
- nasopharynx cancer
  - carcinogen-contaminated foods: 959
  - Indonesia: 1068
- ovary cancer, California (Oakland): 1089
- pancreas cancer, Connecticut: 1080
- prostate cancer, Rhodesia (African): 1087
- skin cancer, India (Calcutta): 929
- stomach cancer, familial, Japan: 1078
- ureter cancer, Norway: 1088
- uterus cancer
  - high- and low-risk groups: 1094
  - New York City: 1096
  - Ohio (Toledo): 1095

ESOPHAGUS NEOPLASMS
- adenocarcinoma or epidermoid carcinoma, comparison: 1079
- alcohol consumption, Africa: 960,1067
- epidemiology
  - carcinogen-contaminated foods: 959
    - local alcoholic beverages, Africa: 960
  - Korea: 921
- radiation-induced, mouse: 932
  - species difference, rodent: 933
- smoking, Africa (Natal): 1067
- traumatic (lye corrosion), adolescent: 921

ESTROGENS (See under Hormones)

ETHNIC GROUPS
- Oriental, leukemia incidence, Hawaii and Asia: 1072

EYE NEOPLASMS
- melanoma, with colon polyposis: 1117

FATS
- heated, s.c. sarcoma and other tumors, rat: 947

N-2-FLUORENYLACETAMIDE, N-HYDROXY-
- distribution, serum proteins, rat: 939

FOODS
- contamination, *Aspergillus*, aflatoxin production *in vitro*: 986
  - sanguinarine and benz(c)acridine (from poppy-fumaria plants), esophagus and nasopharynx cancer: 959

GASTROINTESTINAL CARCINOGENESIS
- biphenyl derivative, rat: 950

GASTROINTESTINAL DISEASES
- peptic ulcer, fetal or cancer antigen: 1116
- ulcerative colitis or multiple polyps, malignant transformation: 1117

GASTROINTESTINAL NEOPLASMS
- epidemiology, Connecticut: 1080

GENETICS, ANIMAL
- leukemia virus resistance, mouse: 1019,1020, 1025
  - review: 900
- mammary tumor virus resistance, mouse: 1053
- Rous sarcoma virus resistance, mechanism, chick embryo cells: 1047

GENETICS, CELLULAR
- polyoma virus-transformed hamster cells: 996

GENETICS, HUMAN
- albinism, skin cancer: 929
- familial colon or endometrium cancer, review: 910
- melanoma, 3 generations: 918
- skin cancer and chronic lymphatic leukemia, brothers: 1126
- stomach cancer, familial, Japan: 1078

GENITAL NEOPLASMS, FEMALE
- epidemiology, Germany (Jena): 1091

HEMATOPOIESIS
- RBC, effect of leukemia virus, mouse: 1038

HORMONES
- adrenal, metabolism, breast cancer: 1119
- androgens
  - metabolism, normal or tumor (adenovirus-induced) cell lines, hamster: 1005
  - production, spontaneous testis tumors, rat: 955
- estrogens
  - circulating, prostate cancer, Africa: 1087
  - effect on methylcholanthrene cervix dysplasia, monkey: 952
  - metabolism, normal or tumor (adenovirus-induced) cell lines, hamster: 1005
  - production, spontaneous testis tumors, rat: 955
- pituitary, dependence, spontaneous testis tumors, rat: 955

HYDRAZINE SULFATE
- toxicity, liver, rat: 983

HYDROCARBONS, POLYCYCLIC AROMATIC
- biosynthesis *in vitro*, algae: 940

IMMUNITY
- adenovirus-induced tumors, antiserum effects, rat or hamster: 1001,1050
- antibody formation to possible virus, human osteosarcoma: 1061
- explt. tumors, review: 901,903,904
- fetal or cancer antigen, stomach cancer and peptic ulcer: 1116
- hydroxyanthranilic acid as hapten, mouse: 977
- human cancer, review: 899,901,902,904
- liver antigens, carcinogen-treated rat: 979
- lymph node antibodies *in vitro*, virus-induced hamster tumor: 1006
- mammary tumor virus, genetics, mouse: 1053
- methylcholanthrene sarcoma, rat: 951

SUBJECT INDEX

MMUNITY (Contd.)
  radiation carcinogenesis, review: 912
  Rous virus sarcoma, chicken: 1045,1050
  sarcoma virus, mouse: 1039,1041
  SV40 antigens, human, hamster or mouse cell lines: 998
  tumor cell antigens, genetic control, review: 900
  virus-induced leukemia (mouse): 1018,1026
    host genotype: 1019,1020
    pregnancy and lactation: 1028,1029,1030
  Yaba virus-induced tumors, monkey: 1064
NJURIES (See also under Scar tissue)
  burns, skin cancer, human: 919,929
  chemical, esophagus cancer (lye corrosion), adolescent: 921
    skin cancer, human: 919
  mechanical, melanoma, human: 918
    skin cancer, human: 919,920,929
NTERFERON
  effect on leukemia virus infection, mouse: 1036
  induction (synthetic RNA polynucleotide), effect on virus leukemia, mouse: 1037
NTESTINAL NEOPLASMS
  biphenyl derivative, rat: 950
NTESTINE, LARGE, NEOPLASMS
  adenomatous polyposis, malignant transformation: 1117
SONICOTINIC ACID HYDRAZIDE
  negative results, children: 958

KIDNEY
  interstitial cells, growth and development, rat: 957
KIDNEY CARCINOGENESIS
  cycasin, mechanism, rat: 957
  diethylnitrosamine, pregnant and fetal rodent, review: 911
KIDNEY NEOPLASMS
  Lucké adenocarcinoma (frog), virus-induced, ultrastructure: 991
  smoking and urbanization, U.S.: 975

LACTATION
  milk transmission of leukemia virus and immunity, mouse: 1028,1029,1030
γ-LACTONES
  prediction of carcinogenic effect, method: 941
LARYNX NEOPLASMS
  epidemiology, Connecticut, smoking: 1081
    Poland (Cracow), smoking: 971
LEPROSY
  cancer risk: 1107
LEUKEMIA, EXPERIMENTAL (See under Leukemogenesis or Virus, leukemia/lymphoma)
LEUKEMIA, HUMAN
  acute
    cell kinetics, mechanism, review: 1102, 1103
    karyotype: 1113,1114
    myeloid, cell line (LI-1), morphology and immunoglobulins: 1056
LEUKEMIA, HUMAN (Contd.)
  cell lines, morphology and virus production: 1058
  chronic lymphatic
    cell kinetics, review: 1100
    with skin cancer, brothers: 1126
  chronic myeloid, cell kinetics, review: 1101
  with colon polyposis: 1117
  differential diagnosis (WBC enzymes): 1125
  epidemiology
    Hawaii: 1072
    Italy (Turin): 1073
    leprosy: 1107
    Minnesota (Olmsted County): 1071
  herpes-type virus, isolation: 1055
  polio vaccination, child, Australia (Brisbane and Sydney): 1054
  smoking and urbanization, U.S.: 975
  virus-like particles: 1055,1059
LEUKEMOGENESIS (EXPERIMENTAL)
  benzpyrene, mouse: 954
  dimethyl- or trimethylbenzanthracene, mouse: 954
  methylcholanthrene, mouse: 954
LEUKOSIS (LEUKEMIA), AVIAN
  Marek's disease, properties of virus: 1015, 1016,1017
LEUKOSIS (LEUKEMIA), BOVINE
  cell lines (lymphosarcoma), karyotype and _in vitro_ growth: 1014
LIVER
  aflatoxin effects
    chick embryo: 984
    enzyme induction, rat: 988
    species difference (mouse and rat): 987
  antigens, carcinogen-treated rat: 979
  carcinogen toxicity, rat: 981,983
  embryonic, effect of dimethylnitrosamine _in vitro_, rat: 980
  hydroxyanthranilic acid as hapten, mouse: 977
LIVER CARCINOGENESIS
  diethylnitrosamine
    age and sex differences, rat: 982
    pregnant and fetal rodent, review: 911
  dimethylaminoazobenzene, liver glycolysis and enzymes, rat: 978
  dimethylnitrosamine, rat: 976
LIVER NEOPLASMS
  transplanted hepatoma, aflatoxin inhibition, rat: 985
  Yoshida hepatoma #7974 (rat), ultrastructure, virus particles: 1121
LUNG
  tobacco smoke constituent retention, human: 969
LUNG CARCINOGENESIS
  dimethylnitrosamine, rat: 976
  nitroquinoline oxide, effect of aluminum compounds, mouse: 965
  radiation, species difference, rodent: 933
  Yaba virus, monkey: 1063,1064
LUNG DISEASES
  tuberculosis, and cancer, smoking: 1083
    lung and other cancer, USSR (Leningrad): 1082

- LUNG NEOPLASMS
  - air pollution, Canada: 1085
  - asbestos exposure: 963
  - epidemiology, Canada (native-born or immigrants): 1085
  - radiation exposure, Hiroshima: 927
  - smoking: 963
    - Canada: 1085
    - Hiroshima survivors: 927
    - Natal Africans: 1065
    - review: 914
    - and tuberculosis: 1083
    - and urbanization, U.S.: 975
  - tuberculosis, USSR (Leningrad): 1082
- LYMPHOMA, MALIGNANT, EXPERIMENTAL
  - amphibia, review: 908
  - Gross virus (mouse), cell lines, properties: 1021
  - plasma cell tumor (mouse), virus isolation: 1013
- LYMPHOMA, MALIGNANT, HUMAN
  - Burkitt
    - cell lines, herpes simplex virus infection: 1060
    - epidemiology, Poland (Szczecin): 1075
    - karyotype: 1114
  - cell lines, immunoglobulin production: 1056
    - virus production: 1057,1058
  - epidemiology
    - Israel: 1108
    - Italy (Turin): 1074
    - leprosy: 1107
  - herpes-type virus, isolation: 1055
  - Hodgkin's disease, epidemiology, review: 905
  - virus-like particles: 1055,1059

- MALIGNANT TRANSFORMATION
  - benign bone diseases, human: 1123,1124
  - cervix dysplasia to carcinoma *in situ*, mechanism: 1099
  - colon polyposis: 1117
  - respiratory papillomatosis, smoking: 972
  - role of cell membranes, review: 909
- MAMMARY GLAND
  - aging *in vivo*, agent-positive or agent-free mice: 1051
- MAMMARY NEOPLASMS, EXPERIMENTAL (See also Virus, mammary tumor)
  - selective aggregate formation *in vitro*, mouse: 1049
- MAMMARY NEOPLASMS, HUMAN
  - adrenal function: 1119
  - appendectomy: 1077
  - benign or malignant, karotype: 1112
  - virus-like particles: 1059
- MAREK'S DISEASE (See under Leukosis, avian)
- MAREK'S DISEASE VIRUS (See under Virus, leukemia/lymphoma)
- METABOLISM (glycolysis & respiration)
  - associated enzymes, liver dimethylaminoazobenzene carcinogenesis, rat: 978
  - Rous virus transformation, chick embryo cells: 1048
- 3-METHYLCHOLANTHRENE
  - cervix cancer, effect of oophorectomy, mouse: 953
- 3-METHYLCHOLANTHRENE (Contd.)
  - dysplasia, effect of estrogen, monkey: 952
  - effect on trachea *in vitro*, rat: 964
  - leukemia, mouse: 954
  - oxidation, free radical formation: 937
  - s.c. sarcoma, immunization, rat: 951
- MOUTH DISEASES
  - periodontoclasia and tooth loss, smoking: 974
- MOUTH NEOPLASMS
  - epidemiology
    - Australia (Victoria), smoking: 1084
    - India, alcohol and tobacco use: 973

- NASOPHARYNX NEOPLASMS
  - epidemiology, carcinogen-contaminated foods: 959
    - Indonesia, smoking and other factors: 1068
  - occupational, pilots of non-pressurized airplanes: 922
- NEOPLASMS, EXPERIMENTAL
  - BHK 21/13 clone (hamster), and polyoma virus: 1120
  - chemically induced, hamster, review: 907
  - Guérin carcinoma (rat), serum oncolytic activity: 949
  - immunity, review: 904
  - immunoglobulin-producing plasma cell tumors, karyotype, mouse: 1115
  - Moloney virus rhabdomyosarcoma (mouse), ultrastructure: 1062
  - plant, virus-induced, effect of tannic acid and ellagic acid: 990
  - Sarcoma 45 (rat), effect of dimethylbenzanthracene on mitosis *in vitro*: 945
  - Schmidt's Yoshida hepatoma (rat), inhibition by aflatoxin: 985
  - tobacco smoke, review: 914
  - transplantable chondrosarcoma, hamster, properties: 1122
  - urethan induction, rat: 948
  - virus- or chemically induced, tumor-specific surface agglutinin: 997
- NEOPLASMS, HUMAN
  - epidemiology
    - appendectomy, New York City: 1076
    - businessmen, Great Britain (London): 1086
    - leprosy: 1107
    - Natal Africans: 1065
    - South Vietnam (Saigon): 1066
  - immunity, review: 899,901,904
  - isoniazid-treated children: 958
  - with pregnancy: 1090
  - prevention and control, review: 906
  - virus immunology, review: 902,903
    - isolation, herpes-type: 1055
- 4-NITROQUINOLINE
  - effect on sea urchin embryo: 943
- 4-NITROQUINOLINE-1-OXIDE
  - effect on sea urchin embryo: 943
  - interaction with thiamine, complex formation: 989
  - lung tumors, effect of aluminum compounds, mouse: 965
- NITROSAMINE, DIETHYL-
  - analysis, alcoholic beverages, Africa (Zambia): 960

ITROSAMINE, DIETHYL- (Contd.)
  liver tumors, rat, age and sex differences: 982
  toxicity, liver, rat: 981
  transplacental carcinogenesis, rodent, review: 911
ITROSAMINE, DIMETHYL-
  effect on normal cells: 980
  liver tumors, rat: 976
  lung tumors, rat: 976
  toxicity, liver, rat: 983

ITROSAMINE DERIVATIVES
  analysis, alcoholic beverages, Africa (Zambia): 960
ITROSOMETHYLUREA
  mechanism of action, bacteria: 944
ITROSOMETHYLURETHAN
  mechanism of action, bacteria: 944
UCLEIC ACIDS, DNA
  effect of
    dimethylbenzanthracene, normal or tumor cells: 945
    nitroso compounds, bacteria: 944
  polyoma virus, infectivity, mouse cells: 994
  Rous virus-transformed cells: 1048
  simian adenovirus (SA7), infectivity _in vitro_: 999
UCLEIC ACIDS, RNA
  effect of aflatoxin, chick embryo liver cells: 984
  leukemia virus-infected cells, structure, comparison to viral RNA: 1033
  Rauscher (mouse) leukemia virus, structure: 1032,1033
  Rous (chicken) sarcoma virus, structure: 1032
  synthetic polynucleotide (polyinosinic acid-polycytidylic acid), effect on virus leukemia, mouse: 1037

CCUPATIONAL DISEASES
  asbestos exposure, lung cancer, smoking: 963
    pleural or peritoneal mesothelioma: 915, 962
  bladder cancer, diagnosis: 961
  nasopharynx cancer, pilots of non-pressurized airplanes: 922
  ^{226}Ra exposure, WBC chromosomes: 925
  skin carcinoma, mechanical, thermal or chemical injury: 919
ILS
  heated, s.c. sarcomas and other tumors, rat: 947
ILS, EDIBLE
  Argemone mexicana, carcinogen content: 959
OPHORECTOMY (See under Endocrine ablation)
PIUM
  smoking, nasopharynx cancer, Indonesia: 1068
VARY NEOPLASMS
  epidemiology, California (Oakland): 1089
  induction, dimethyl- or trimethylbenzanthracene, mouse: 954
    radiation, pathogenesis, mouse: 934
  karyotype: 1109

PANCREAS NEOPLASMS
  epidemiology, Connecticut: 1080
  islet cell, swine: 1070
PAPILLOMA VIRUS (See under Virus, papova)
PERITONEAL NEOPLASMS
  mesothelioma, asbestos exposure: 962
  sarcoma, child, transmission (hamsters) by cell-free extract: 1011
PHENALEN-1-ONE
  air pollution, analysis, method: 938
PLANTS (See also under Tobacco)
  poppy-fumaria family, carcinogen production:
  virus-induced tumors, effect of tannic and ellagic acids: 990
PLEURAL NEOPLASMS
  mesothelioma, asbestos, review: 915
POLYOMA VIRUS (See under Virus, papova)
PREGNANCY
  Caesarean section, women with or without breast cancer: 1077
  human, with cancer: 1090
  transplacental diethylnitrosamine carcinogenesis, rodent, review: 911
    leukemia virus and virus immunity transmission, mouse: 1028,1029,1030
PROSTATE NEOPLASMS
  circulating estrogens, Africa: 1087
  epidemiology, Rhodesia (African): 1087

RADIATION
  atomic, effect on WBC chromosomes, Hiroshima survivors: 926
  effect on serum oncolytic activity, tumor-bearing rat: 949
RADIATION CARCINOGENESIS
  bone, child: 930
    species difference, rodent: 933
    virus isolation, mouse: 931
  esophagus, mouse: 932
    species difference, rodent: 933
  historical review: 917
  immunology, review: 912
  lung, and smoking, Hiroshima: 927
    species difference, rodent: 933
  ovary, pathogenesis, mouse: 934
  skin, human: 919,929
    rat: 936
  sunlight, skin cancer, human: 919,929
      albinism: 929
RADIOISOTOPES
  bone-seeking, mechanism of action, mouse: 931
  ^{137}Cs, blood distribution, geographical variations: 923
  ^{210}Po, blood, smokers: 928
  ^{226}Ra, occupational exposure, WBC chromosomes: 925
  ^{90}Sr, balance with calcium, human: 924
    toxicity, rat: 935
RECTUM NEOPLASMS
  premalignant or malignant, diagnosis and treatment: 1118
RESPIRATORY TRACT CARCINOGENESIS
  diethylnitrosamine, pregnant and fetal rodent, review: 911

RESPIRATORY TRACT NEOPLASMS
  papillomatosis, malignant transformation, smoking: 972

SALIVARY GLANDS
  secretion, smoking, human: 967
SCAR TISSUE
  burns, skin cancer, human: 919,929
  chemical injury, esophagus cancer (lye corrosion), adolescent: 921
    skin cancer, human: 919
  malanoma, human: 918
  skin carcinoma, human: 919,920,929
SEX
  chromosomes, hydatidiform mole: 1110
  difference, diethylnitrosamine liver carcinogenesis, rat: 982
SKIN DISEASES
  albinism, skin cancer: 929
SKIN CARCINOGENESIS
  anisole derivatives, guinea pig: 942
  benz(c)acridine, mouse: 959
  bovine papilloma virus, hamster: 993
  heated dietary fats, rat: 947
  melanoma, virus induction, hamster: 1012
  methylcholanthrene, immunization, rat: 951
  radiation, rat: 936
  Yaba virus (histiocytoma), monkey: 1063,1064
SKIN NEOPLASMS
  epidemiology, India (Calcutta): 929
  familial, brothers with chronic leukemia: 1126
    melanoma (3 generations): 918
  from osteomyelitis with fistula: 1123
  melanoma, traumatic: 918
  sun exposure, albinism: 929
  traumatic, human: 918,919,920,929
SKULL NEOPLASMS
  connective tissue type, review: 913
STOMACH NEOPLASMS
  familial, Japan: 1078
  "fetal" or "cancer" antigen: 1116
SURGERY
  appendectomy, breast cancer: 1077
    cancer incidence (all tumors), New York City: 1076
  Caesarean section, breast cancer: 1077
SV40 (See under Virus, papova)

TANNIN COMPOUNDS
  tannic acid and ellagic acid, effect on plant tumor virus: 990
TESTIS NEOPLASMS
  induction, CdCl$_2$, enzyme metabolism, mouse: 956
  spontaneous, hormone metabolism, rat: 955
THIAMINE
  interaction with nitroquinoline oxide, complex formation: 989
THIOCYANATES
  saliva and urine, smoking, human: 968
THYROID NEOPLASMS
  epidemiology, cattle, sheep and swine, Britain: 1070

TISSUE EXTRACTS
  clam (*Mercenaria mercenaria*), effect on adenovirus tumors, hamster: 1004
TOBACCO
  carcinogenesis, historical review: 917
  chewing, mouth cancer, India: 973
  potato virus infection, effect of tannic acid and ellagic acid: 990
TOBACCO SMOKE
  carcinogenesis, animals and man, review: 914
  effect on blood constituents, animal: 966
    salivation, human: 967
  retention, human lung preparation: 969
  toxicity, human bronchi: 970
TOBACCO SMOKING
  appendectomy and cancer, New York City: 1076
  bladder cancer, U.S.: 975
  blood ^{210}Po: 928
  esophagus cancer, Natal Africans: 1065
  habits, businessmen, London: 1086
  kidney cancer, U.S.: 975
  larynx cancer, Connecticut: 1081
    Poland (Cracow): 971
  leukemia, U.S.: 975
  lung cancer
    Canada (immigrants or native-born): 1085
    Natal Africans: 1065
    occupational asbestos exposure: 963
    radiation exposure, Hiroshima: 927
    U.S.: 975
    with/without TB: 1083
  malignant transformation of respiratory papillomatosis: 972
  mouth cancer, Australia (Victoria): 1084
    India: 973
  nasopharynx cancer, Indonesia: 1068
  periodontal diseases: 974
  urinary and salivary thiocyanates, human: 968
TOXICITY
  diethylnitrosamine, liver, rat: 981
  endocrine organs, dimethyl- and trimethylbenzanthracene, rat and mouse: 954
  liver carcinogens, rat: 983
  smoking, bronchi, human: 970
  ^{90}Sr, rat: 935
TRACHEA
  effect of carcinogens *in vitro*, rat: 964
TRAUMA (See under Injuries or Scar tissue)

ULCER, PEPTIC (See under Gastrointestinal diseases)
URETER NEOPLASMS
  epidemiology, Norway: 1088
URETHAN
  multiple tumors, rat: 948
UTERUS (See Corpus uteri)

VASCULAR NEOPLASMS
  Rous sarcoma virus-induced, pathogenesis, chick embryo: 1046
VIRAL CARCINOGENESIS
  cell kinetics, mechanism: 1105
  genetic control, review: 900
  immunology, review: 901,903

- IRAL CARCINOGENESIS (Contd.)
  - review (book): 903,916
- IRUS
  - herpes simplex, infection, Burkitt lymphoma cell lines: 1060
  - Lucké kidney adenocarcinoma (frog), morphology, nucleolus: 991
  - melanoma, hamster: 1012
  - particles resembling, transplanted rat hepatoma: 1121
  - plant, potato virus X, effect of tannic acid and ellagic acid, tobacco plant: 990
  - plasma cell tumor, mouse, isolation and properties: 1013
  - Yaba, lung and other tumors, monkey: 1063,1064
- IRUS, ADENO-
  - hamster tumors, effect of shark serum: 1050
  - human cancer, review: 902
    - effect of adeno-associated viruses, hamster: 1002,1003
    - subgroup C (types 1, 2, 5 and 6), properties: 1000
  - review (book): 916
  - simian type 7 (SA7), infectivity of DNA *in vitro*: 999
  - SV20, pathology and ultrastructure, hamster brain tumors: 1007
  - transformed cells, tumor-specific surface agglutinin: 997
  - type 2, transformed cells, tumor induction, antiserum-treated rat: 1001
  - type 12
    - effect of clam extract, hamster: 1004
    - hamster tumor cell lines, androgen and estrogen metabolism: 1005
    - *in vitro* immunology of lymph nodes from tumor-bearing hamster: 1006
- IRUS, LEUKEMIA/LYMPHOMA
  - amphibian lymphoma, review: 908
  - avian leukosis, Marek's disease, isolation and properties: 1015,1016,1017
  - feline leukemia (lymphosarcoma) transmission: 1009
    - ultrastructure: 1008,1010
  - Friend (mouse)
    - bioassay, method: 1024
    - growth patterns: 1031
    - low-infectivity sublines: 1027
    - placental and milk transmission: 1028, 1029,1030
    - relation to rat lymphatic leukemia virus: 1023
    - separation of 3 components: 1022
    - spleen focus-forming component, genetic susceptibility: 1025
    - transplantation immunity: 1026
  - Gross (mouse)
    - host genotype and virus sensitivity: 1019, 1020
    - lymphoma cell lines: 1021
    - soluble tissue and plasma antigens: 1018
  - human
    - herpes-type, isolation, cancer or leukemia: 1055
      - normal or leukemic lymphoblasts: 1058
      - lymphoma cell line: 1057
- VIRUS, LEUKEMIA/LYMPHOMA (Contd.)
  - human (Contd.)
    - morphology: 1059
    - polio vaccine, possible SV40 contamination, Australia: 1054
    - sarcoma, transmission (hamster): 1011
  - isolation (hamster skin tumors) and transmission (hamsters and mice): 1011
  - lymphatic leukemia (rat), relation to mouse leukemia (Friend): 1023
  - Moloney (mouse)
    - effect on host RBC: 1038
    - interaction with Moloney sarcoma virus: 1040
  - Rauscher (mouse)
    - cell lines: 1033,1034,1035
    - effect of interferon or interferon induction *in vivo*: 1036,1037
    - growth patterns: 1031
    - RNA structure: 1032,1033
  - review (book): 916
- VIRUS, MAMMARY TUMOR
  - agent-positive or agent-free mice, mammary gland aging *in vivo*: 1051
  - Bittner, resistance, genetics, mouse: 1053
  - human, morphology: 1059
  - pathogenesis of infection, mouse: 1052
  - RBC, bioassay, mouse: 1052
- VIRUS, PAPOVA (papilloma-polyoma-vacuolating)
  - bovine papilloma, hamster skin tumors: 993
  - human wart, ultrastructure: 992
  - polyoma
    - DNA infectivity, mouse cells: 994
    - effect on hamster cell clone: 1120
    - mechanism of action, transformed cells: 1105
    - radiation effects, hamster: 995
    - transformation, cell genetics: 996
      - surface agglutinins: 997
  - review (book): 916
  - Shope papilloma (rabbit), ultrastructure: 997
  - SV40
    - possible polio vaccine contamination, leukemia, children, Australia: 1054
    - transformation, cell antigens and agglutinins: 997,998
- VIRUS, SARCOMA
  - FBJ osteosarcoma (mouse), effect on radionuclide carcinogenesis: 931
  - Fujinami (duck), transformation, biochemical changes, duck embryo cells: 1042
  - Harvey (mouse), immunology *in vivo*: 1041
    - transformation, biochemical changes, rat embryo cells: 1042
  - human
    - antibody formation, osteosarcoma: 1061
    - child, rhabdomyosarcoma: 1062
      - transmission to hamster: 1011
  - Moloney (mouse)
    - biological activity of third component: 1040
    - immunology of tumor regression: 1039
    - interaction with Moloney leukemia virus: 1040
    - rhabdomyosarcoma, ultrastructure: 1062
  - RBI (rat; from Rous sarcoma), tumor induction, chicken: 1043

VIRUS, SARCOMA (Contd.)
- Rous (chicken)
  - effect of shark serum: 1050
  - effect on DNA, transformed chick embryo cells: 1048
    - glycolysis, transformed chick embryo cells: 1048
  - host immunity: 1050
  - immunology of regressing tumors: 1045
  - infected cells, selective aggregate formation: 1049

VIRUS, SARCOMA (Contd.)
- Rous (chicken) (Contd.)
  - mouse tumors: 1044
  - pathogenesis of vascular tumors, chick embryo: 1046
  - rat variant (RBI), tumor induction, chicken: 1043
  - resistance, genetics, chick embryo cells: 1047
  - RNA structure: 1032
  - transformation, biochemical changes, chick embryo cells: 1042

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

THE LIBRARY OF THE
JUL 3 1969
UNIVERSITY OF ILLINOIS

OD

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

616.99405
CAR

Vet. Med

JUNE 1969
Abstract Nos. 1127-1349

Vol. 7
No. 6

JUL 14 69

DD

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

CARCINOGENESIS ABSTRACTS

Volume 7, Number 6
June, 1969

Abstract Numbers
1127-1349

(Submitted for Publication
March, 1969)

CONTENTS

	Page
Review	241
Physical Carcinogenesis	247
Chemical Carcinogenesis	251
Viral Carcinogenesis	265
Epidemiology and Biometry	272
Miscellaneous	282
Author Index	i
Subject Index	iv

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a na-
ional program of cooperative research in cancer, is establishing a means whereby information
n the field of carcinogenesis will be coordinated and made available. The information to be
ncluded will be obtained from the National Cancer Institute, other governmental agencies, and
on-governmental research institutions.

The issuing of Carcinogenesis Abstracts under the auspices of the National Cancer Insti-
ute will provide a central source for current abstracting of the carcinogenesis literature be-
ng published throughout the world. This will help facilitate an integrated and cooperative
rogram of investigation in this area. The growing number of publications in the area of car-
inogenesis makes imperative the availability of an appropriate abstracting service so that in-
estigators may be apprised of progress with a minimum of delay. It is our desire to provide
he investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most
ecently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by Index Medicus.
f the journal is not covered by Index Medicus, then the abbreviations (with some modifications)
ound in World Medical Periodicals, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

dmin.	administered, administration	mg	milligram(s)
v.	average	min.	minute(s)
	curie(s)	ml	milliliter(s)
C	millicurie(s)	mm	millimeter(s)
C	microcurie(s)	mo.	month(s)
m	centimeter(s)	MTD	maximum tolerated dose
onc.	concentration	NIH	National Institutes of Health, USA
pm	counts per minute	p.o.	orally
NA	deoxyribonucleic acid	QO_2	oxygen quotient
Nase	deoxyribonuclease	PFU	plaque forming unit
.g.	for example	ppm	parts per million
FU	focus forming unit	pt.(s)	patient(s)
.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
	gram(s)	RES	reticuloendothelial system
g	microgram(s)	resp.	respectively
b	hemoglobin	RNA	ribonucleic acid
.a.	intra-arterial	RNase	ribonuclease
D_{50}	median infectious dose	soln.	solution
nj.	injected, injection(s)	s.c.	subcutaneous
noc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
.p.	intraperitoneal	x	times (e.g. x 3/wk.)
.U.	international unit(s)	U	unit
.v.	intravenous	UV	ultraviolet
g	kilogram(s)	vol.	volume
D_{50}	median lethal dose	VA	Veterans Administration
	molar, mole(s)	wt.	weight
M	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
M	micromole(s)		
ax.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

f.	Afrikaans	E.	English	Hun.	Hungarian	Lith.	Lithuanian	Ser.	Serbo-Croatian
r.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
ul.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
h.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
z.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
an.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
ut.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

69-1127 SOME STATISTICAL VIEWPOINTS IN THE STUDY OF CARCINOGENESIS. (E.) Mantel, N. (NIH, Bethesda, Md.). Progr. Exp. Tumor Res. 11:431-443, 1969. (5 references)

Statistical methods used in safety testing, studies of radionuclide ingestion and related concepts (man), carcinogen screening studies (using weanling rats as an example) and carcinogenesis in newborn animals (using mice as an example) are discussed.

69-1128 THE ONCOGENIC DNA VIRUSES: A REVIEW OF IN VITRO TRANSFORMATION STUDIES. (E.) Black, P. H. (Harvard Med. Sch., Boston, Mass.). Ann. Rev. Microbiol. 22:391-426, 1968. (291 references)

The early steps in transformation by DNA-containing tumor viruses (including polyoma, papilloma, SV40 and adenoviruses), including induction of T antigen and enzymes, derepression of DNA synthesis and fixation of the viral genome, are discussed. The persistence of the viral genome in the transformed cells is compared to the phenomena seen with the lysogenic bacteria.

69-1129 THE NZB MOUSE. (Fr.) Varet, B. (St. Louis Hosp., Paris). Path. Biol. (Paris) 16(19-20):885-892, 1968. (57 references)

New Zealand Black (NZB) mice and their hybrids are characterized by autoimmune hemolytic anemia, glomerulonephritis and other symptoms resembling systemic lupus erythematosus in man; aged NZB mice also show a relatively low incidence of spontaneous lymphomas (which may represent only permanent stimulation of the RES). Studies of back-cross hybrids suggest the presence of 3-5 genes controlling the transmission of the hemolytic disease, which are at least partially the same as the genes determining the development of the kidney disease. Particles resembling mouse leukemia viruses can be detected in the tissues of NZB mice. Cell-free extracts of the lymphoma can induce glomerulonephritis. The possibility that this syndrome may be an "autoimmune viral disease" analogous to lymphocytic choriomeningitis (mice) or Aleutian disease (mink) is discussed. The role of the virus in the autoimmune disease and the lymphoma is still uncertain.

69-1130 CHEMICAL CARCINOGENESIS IN INFANT ANIMALS. (E.) Della Porta, G. (Nat. Inst. Study Cure Tumors, Milan, Italy) and B. Terracini. Progr. Exp. Tumor Res. 11:334-363, 1969. (118 references)

Slower catabolism of carcinogens in newborn and young animals is suggested as 1 reason for the increased susceptibility of young mice to certain chemical carcinogens (particularly those inducing pulmonary adenoma, hepatoma and thymic lymphosarcoma). Young animals show a more consistent response to small doses, a shorter latent period and a higher tumor yield than adult animals. Multiple-dose carcinogen admin. during the suckling period is preferred to a single dose during the neonatal period; however, a prolonged observation period is still required (at least 1 yr. for hepatoma induction). It is concluded that neonatal carcinogenesis is not necessarily a safe substitute for the conventional long-term treatment, and that its practical importance is presently limited to the mouse.

69-1131 TOBACCO CARCINOGENESIS. (E.) Van Duuren, B. L. (New York U. Med. Ctr., N. Y.). Cancer Res. 28(11):2357-2362, 1968. (31 references)

Current research (methods and results) is discussed, with particular reference to the author's studies. The most commonly used bioassays for carcinogenicity studies are skin application (mice) and s.c. inj. (mice and rats), but more extensive studies of in vitro cell systems and long-term tests of fresh smoke in avian and mammalian lungs are recommended. Tests of tumor-promoting activity by skin application of the initiators are preferable to tests using systemically admin. initiators; mixed tissue cultures may be a useful and rapid in vitro bioassay. Studies of the isolation of carcinogens and tumor-promoting agents from tobacco leaf and tobacco smoke condensate are also discussed.

69-1132 BIOASSAYS IN TOBACCO CARCINOGENESIS. (E.) Wynder, E. L. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.) and D. Hoffmann. Progr. Exp. Tumor. Res. 11:163-193, 1969. (55 references)

After discussing animal and tissue culture bioassay systems, the authors conclude that the mouse skin bioassay is the preferred method for determining carcinogenesis by tobacco smoke condensate (TSC) and its fractions and by tobacco extracts. The preferred system for respiratory tract bioassays is the forced-inhalation method in tracheotomized dogs (at least for short-term studies). Methods of reducing the carcinogenicity of tobacco smoke by filtration and addition of nitrates are also discussed. Both methods reduce the carcinogenicity of TSC and tobacco tars in the mouse skin bioassay, but the reduced carcinogenicity and polycyclic aromatic hydrocarbon content of tars and TSC from nitrate-containing cigarettes is not parallelled by a reduction of the tumor-promoting activities of the tars. It is mentioned that the incidence of both bronchitis and lung cancer is significantly higher in Britain (where the tobaccos used are 100% flue-cured and almost nitrate-free) than in France (where nitrate-rich tobaccos are used).

69-1133 A GEOGRAPHIC STUDY OF THE RELATIONSHIP BETWEEN ORAL CANCER AND PLANTS. (E.) Dunham, L. J. (NIH, Bethesda, Md.). Cancer Res. 28(11):2369-2371, 1968. (15 references)

The relationship between a high incidence of oropharyngeal cancer and chewing of plant preparations (betel, coca, tobacco) with added lime is discussed. It is suggested that lime (calcium hydroxide) releases alkaloids from the plants and hastens their physiological effects, as well as damaging the oral mucosa and facilitating the carcinogenic effects of the plants. Preliminary results of an experiment using 6 medicinal brews from Curacao (tested in hamster cheek pouches injured by lime) are briefly reported.

69-1134 REFLECTIONS ON THE CARCINOGENIC EFFECT OF ASBESTOS. (Fr.) Desbordes, J. (Calmette Hosp., Le Havre, France), J. Tayot and G. Dousset. Poumon Coeur 24(5):607-623, 1968. (78 references)

Recent studies confirming or denying the specific carcinogenic effects of asbestos are discussed. It is suggested that this divergence of opinion is partly due to a lack of systematic clinicopathological research in France, permitting many cases of associated asbestos exposure and cancer to go undetected (most papers denying the carcinogenic effects of asbestos were written by French authors), and partly to the prolonged latent period in asbestos-induced cancer. This latent period may be 20-40 yr. after the beginning of asbestos exposure, and cancer may develop many yr. after the pt. has left the job that entailed asbestos exposure. The increased life expectancy resulting from reduced mortality from cardiopulmonary insufficiency (which is 5-10 times more frequent in asbestos-exposed persons than in the normal population of the same age) also permits more cancers to become manifest.

69-1135 CANCER AMONG THE OCCUPATIONAL OTORHINOLARYNGOLOGIC DISEASES. (Fr.) Calvet, J. and J. Coll. Arch. Mal. Prof. 29(9):516-519, 1968. (No references)

Occupational causes of cancer of the external ear, nose and nasal sinuses, trachea, larynx, bronchus, mouth, pharynx and esophagus are discussed. Agents mentioned most frequently include tars and waxes, aromatic hydrocarbons, radioactive materials, chromium (particularly as a cause of nasal cancer), arsenic, nickel and asbestos. The importance of early diagnosis and treatment is emphasized, with particular reference to premalignant lesions; the prevention of exposure to potential carcinogens is also discussed. It is concluded that occupational factors are generally of little importance in otorhinolaryngologic cancer.

69-1136 EXPERIMENTAL RESPIRATORY TRACT CARCINOGENESIS. (E.) Saffiotti, U. (Chicago Med. Sch., Ill.). Progr. Exp. Tumor Res. 11:302-333, 1969. (148 references)

Experimental models of human lung cancer are discussed. The majority of human lung cancers are bronchogenic carcinomas (anaplastic or squamous cell), which can be induced in Syrian golden hamsters by 3,4-benzpyrene (BP) on carrier particles, applied directly to the respiratory tract. Squamous cell carcinoma of the epithelium of the large bronchi is also seen in a high incidence after application of radioactive pellets in direct contact with the bronchial mucosa. Systemic admin. of N-nitroso compounds and other carcinogens induces tumors of the upper respiratory tract. Peripheral types of tumors (bronchiolo-alveolar tumors) are induced by other chemicals (especially the synergistic combination of BP and diethylnitrosamine in hamsters), some viruses, topical irradiation from peripherally deposited particles, inorganic particulates (including asbestos) and inhalation of nickel carbonyl. The only human lung cancer which has not been reproduced experimentally is the oat cell (anaplastic small cell) carcinoma.

69-1137 A RE-EVALUATION OF THE CONCEPT OF COCARCINOGENESIS. (E.) Berenblum, I. (Weizmann Inst. Sci., Rehovoth, Israel). Progr. Exp. Tumor Res. 11:21-30, 1969. (33 references)

Seven types of cocarcinogenesis are discussed. Tumor-promoting agents may have additive, synergistic or incomplete effects (the "incomplete" effect is defined as tumor initiation or promotion only, as with croton oil). Some cocarcinogens make the target organ more responsive to the carcinogen ("preparative action"); others affect the carcinogen's scope of action, such as its cellular absorption, metabolism and/or excretion ("permissive action"). Chemicals and radiation can influence the action of tumor-inducing viruses, while others affect factors required for continued tumor growth or the host's resistance to the tumor ("conditional influence on the tumor").

69-1138 TUMOR-PROMOTING AGENTS IN TWO-STAGE CARCINOGENESIS. (E.) Van Duuren, B. L. (New York U. Med. Ctr., N. Y.). Progr. Exp. Tumor Res. 11:31-68, 1969. (57 references)

The active principles of croton oil were identified as fatty acid esters of phorbol (a polyfunctional diterpene alcohol). Studies of the mechanism of tumor promotion by phorbol esters (PE) in mice treated with 7,12-dimethylbenzanthracene indicated that the lipophilic-hydrophilic properties of the PE were not necessarily prerequisites for tumor-promoting activity. The PE alone were weakly carcinogenic. *In vitro* studies suggested that the PE alter the properties of cell membranes.

69-1139 STUDIES ON MECHANISM OF CARCINOGENESIS IN THE MAMMARY GLAND. (E.) Dao, T. L. (Roswell Park Mem. Inst., Buffalo, N. Y.). Progr. Exp. Tumor Res. 11:235-261, 1969. (47 references)

Experimental mammary carcinogenesis is discussed, with particular reference to the effects of 3-methylcholanthrene (MC) and 7,12-dimethylbenzanthracene (DMBA) in rats. The unique sensitivity of the mammary gland to systemic carcinogen admin. results from the localization of the hydrocarbons in the target tissue (especially the fatty tissue), their slow clearance from the target tissue, and the absence of metabolizing enzymes in the target tissue. The interactions between carcinogenic hydrocarbons and mammary gland cells take place only in the presence of estrogens. The immediate effects of MC and DMBA on mammary gland cells seem to be inhibition of DNA, RNA and probably protein synthesis; neither MC nor DMBA affects RNA synthesis in the absence of estrogens. Evidence is presented suggesting that the carcinogens exert their carcinogenic effects only in certain stages of mitosis (which is enhanced by estrogens); it is also suggested that steroid hormones facilitate the entrance of the carcinogen into the cells by modifying the permeability of the cell membranes.

69-1140 THE LIMITATIONS OF SAFETY TESTING. (E.) Bryson, G. (Santa Barbara Cottage Hosp. Res. Inst., Calif.) and F. Bischoff. Progr. Exp. Tumor Res. 11:100-133, 1969. (79 references)

Sources of erroneous, conflicting and misleading results in animal experiments designed to test the carcinogenic activities of the organic polymers and the inorganic polymer silicate dusts (including asbestos) are discussed, with particular reference to the problems of "solid-state" carcinogenesis. Evidence for solid-state carcinogenesis in man is presented (lung cancer and tuberculosis; lung cancer and mesothelioma in asbestosis and/or silicosis; breast cancer and fibrocystic disease of the breast; bone sarcoma and osteitis fibrosa; liver cancer and cirrhosis). It is suggested that solid-state carcinogenesis involves both physical and chemical effects.

69-1141 THE CORRELATION OF EXPERIMENTAL CARCINOGENESIS AND CANCER IN MAN. (E.) Boyland, E. (Roy. Cancer Hosp., London). Progr. Exp. Tumor Res. 11:222-234, 1969. (29 references)

Some compounds carcinogenic to animals have not been proved carcinogenic to man (e.g., carbon tetrachloride, griseofulvin, iron dextran and isoniazid), although animal tests can detect the most potent human carcinogens. The carcinogenic effects in man of mustard gas (inducing lung cancer), cadmium compounds (inducing prostatic cancer), aromatic amines (inducing bladder cancer) and tar compounds, are parallelled by their carcinogenic properties in animals. Alkylating agents of the nitrogen mustard series are carcinogenic in animals (after inj.), but the only compounds of this group known to be carcinogenic in man is bis(2-chloroethyl)-2-naphthylamine (chlornaphazin); some pts. admin. chlornaphazin for polycythemia vera and lymphoma later developed bladder cancer, and the bladder carcinogen 2-naphthylamine was identified as a chlornaphazin metabolite. Animal tests to determine carcinogenicity are recommended for new drugs before they are released for clinical use. For example, the β-adrenergic blocking agent pronethalol (proposed for the treatment of heart disease) proved carcinogenic in mice, but the related compound propranolol proved both non-carcinogenic and clinically more effective than pronethalol. The toxic and carcinogenic effects of natural products (cycad meal, aflatoxin, bracken toxins) in animals and man are also discussed.

69-1142 THE METABOLIC ACTIVATION OF CARCINOGENIC AROMATIC AMINES AND AMIDES. (E.) Miller, J. A. (U. Wisconsin, Madison) and E. C. Miller. Progr. Exp. Tumor Res. 11:273-301, 1969. (77 references)

The mechanisms of experimental carcinogenesis by aromatic amines and amides are discussed, with particular reference to the effects of 2-acetylaminofluorene and N-methyl-4-aminoazobenzene. The first steps are apparently N-hydroxylation and esterification of the resulting N-hydroxyl groups. These esters are more potent carcinogens than their precursors and more reactive with tissue nucleophiles (including constituents of DNA, RNA and protein); unlike the precursors, the esters are mutagenic. Binding of the esters to nucleic acid (probably DNA) is apparently an initiating step which requires promotion to induce tumor development; the promoting step (which may or may not involve the carcinogen) may involve a reaction of tissue proteins with the carcinogen or a promoter.

69-1143 NATURALLY OCCURRING CARCINOGENS IN FOODS. (E.) Wogan, G. N. (MIT, Cambridge, Mass.). Progr. Exp. Tumor Res. 11:134-162, 1969. (110 references)

Substances discussed include mycotoxins (luteoskyrin and the chlorine-containing peptide from the rice mold *Penicillium islandicum*; aflatoxins from *Aspergillus flavus* or *parasiticus*, contaminating peanuts and other plants) and compounds from cycad seeds (cycasin), *Senecio* and several other species (pyrrolizidine alkaloids), cottonseed (cyclopropenoid compounds) and other food and medicinal products (including sassafras oil, ergot and griseofulvin). Most of these compounds are hepatotoxic and induce liver tumors in rats and/or mice; aflatoxin, cycasin and the pyrrolizidine alkaloids (especially lasiocarpine) are potent carcinogens. Other compounds are relatively weak carcinogens when admin. alone, but show significant cocarcinogenic or tumor-promoting activity when combined with other carcinogens. Epidemiologic studies suggest a correlation between food contamination by mycotoxins (particularly the aflatoxins) and primary liver cancer in man, especially in tropical and subtropical areas.

69-1144 THE CARCINOGENICITY OF ESSENTIAL OILS, FLAVORS, AND SPICES: A REVIEW. (E.)

Homburger, F. (Bio-Res. Inst., Cambridge, Mass.) and E. Boger. *Cancer Res.* 28(11):2372-2374, 1968. (22 references)

Safrole (found in sassafras oil and as a minor constituent in many spices), which induces hepatic adenomas and hepatomas in rats, has been widely used as a flavoring agent in soft drinks and medicines. The major constituent of orange oil, D-limonene, is a skin tumor-promoting agent in mice; since the active component of D-limonene is apparently its hydroperoxide derivative, studies of the prevention of its autoxidation are recommended. Turpentine oil and eucalyptus oil also contain cocarcinogens (L-pinene and phellandrene, resp.); tumor-promoting activity of other essential oils with lower terpene levels is less. Red pepper (*Capsicum*) induces liver tumors in rats. Many food plants contain endogenous carcinogens of the polycyclic aromatic hydrocarbon type (including benzpyrene).

69-1145 BIOCHEMICAL RESPONSES TO AFLATOXINS. (E.)

Wogan, G. N. (MIT, Cambridge, Mass.). *Cancer Res.* 28(11):2282-2287, 1968. (38 references)

A tentative hypothesis for the mechanism of action of aflatoxin B_1 (AB) in rat liver is outlined, with a presentation of published data supporting the hypothesis. The interaction of AB with DNA modifies DNA template activity (and the transcription of DNA), which is followed by inhibition of DNA and RNA polymerase, and then by rapid, marked inhibition of DNA and RNA synthesis. Protein synthesis is also inhibited, especially under those conditions in which protein synthesis is markedly influenced by changes in RNA metabolism. These processes are associated with the acute toxic effects of AB; their relationship to liver carcinogenesis is not certain.

69-1146 TOXICOLOGY OF CYCASIN. (E.)

Laqueur, G. L. (NIH, Bethesda, Md.) and M. Spatz. *Cancer Res.* 28(11):2262-2267, 1968. (61 references)

The mechanisms of action of cycasin (C) and its aglycone (methylazoxymethanol) are discussed. C causes CNS toxicity in cattle, man, newborn mice and fetal rats. The carcinogenic effects of C (rats, mice, guinea pigs, fish and hamsters) are the result of its metabolic conversion *in vivo* to the active substance, C aglycone; this *metabolic* conversion depends primarily on intestinal microorganisms containing a β-D-glucosidase (which is also found in the skin of rats in the first few wk. of life, corresponding to the ages at which C can induce tumors after s.c. inj.). Other studies showed that C aglycone is an alkylating and mutagenic agent, possibly also with radiomimetic activity.

69-1147 THE RADIOMIMETIC NATURE OF BRACKEN TOXIN. (E.)

Evans, I. A. (U. Coll. North Wales, Bangor, United Kingdom). *Cancer Res.* 28(11):2252-2261, 1968. (60 references)

The radiomimetic toxin(s) from young, actively growing bracken fern (*Pteris aquilina*) induce lung adenomas in mice, hematuria in rabbits, bladder tumors in cattle and (sometimes) guinea pigs, and intestinal adenocarcinomas in Japanese quail, sheep, guinea pigs, rats (an age-dependent effect was noted) and young hamsters. The g.i. and bone marrow symptoms of early radiation toxicity can be produced in lambs and calves by the toxin(s). An active fraction containing both the carcinogenic and acutely toxic factors was mutagenic to mice and *Drosophila*.

69-1148 TOXICOLOGY AND CARCINOGENIC ACTION OF PYRROLIZIDINE ALKALOIDS. (E.)

Schoental, R. (Med. Res. Coun. Labs., Carshalton, England). *Cancer Res.* 28(11):2237-2246, 1968. (57 references)

Toxic effects of the pyrrolizidine alkaloids (PA) include liver damage in man, rats and monkeys, and venous occlusion in monkeys, horses, cattle and man (but seldom in rats); mice, guinea pigs and rabbits are much less susceptible to PA toxicity than rats. It is suggested that the use of hepatotoxic herbs containing PA may be related to kwashiorkor in children; it is pointed out that in areas where PA-containing plants were not used medicinally, children with severe malnutrition developed no kwashiorkor-like syndromes. Conventional acute lethal dose experiments are of little value in carcinogenicity studies. A single dose of an aqueous-soluble substance (most of which is excreted within a few hr.), causing no immediate toxic symptoms, can induce tumors after a long latent period. Very young animals (e.g. baby rats nursed by PA-treated females) are much more susceptible to PA hepatotoxicity and hepatocarcinogenesis than adult animals. Adult males are more susceptible to PA than adult females (suggesting a role of the sex hormones).

69-1149 ACUTE AND CHRONIC EFFECTS OF AFLATOXIN ON THE LIVER OF DOMESTIC AND LABORATORY ANIMALS: A REVIEW. (E.) Newberne, P. M. (MIT, Cambridge, Mass.) and W. H. Butler. Cancer Res. 29(1):236-250, 1969. (73 references)

The sites and types of liver lesions (including hepatoma) induced by aflatoxin in poultry (chickens, turkeys, ducklings), rodents (mice, rats, rabbits, hamsters, guinea pigs, ferrets), carnivores (dogs, cats), livestock (cattle, sheep, pigs), trout and monkeys are discussed; LD_{50} values for some of the laboratory animals are tabulated. There is no direct evidence to demonstrate that man is susceptible to aflatoxins, but the association of a high incidence of liver diseases (including cancer) and potentially high aflatoxin exposure suggests a significant degree of susceptibility.

69-1150 DIFFERENTIATION OF MOUSE VAGINAL EPITHELIUM IN THE PROCESS OF THE HORMONAL AND SO-CALLED PRECANCEROUS HYPERPLASIA. (E.) Volfson, N. I. (Res. Inst. Oncol., Leningrad, USSR) and R. M. Sokolovsky. Neoplasma (Bratisl.) 15(4):345-356, 1968. (28 references)

The authors' studies of the mouse cervix and vagina under normal conditions (estrus cycle and pregnancy), after treatment with hormones (diethylstilbestrol, testosterone propionate + progesterone) or carcinogens (7,12-dimethylbenzanthracene), and following chronic intravaginal application of polyurethan sponges or tampons, are summarized. These data (obtained in experiments using more than 3000 mice) indicated that gradually developing and advanced functional and morphological changes in the cervical and vaginal epithelium during carcinogenesis reflected definite, stable disturbances of the cyclic patterns of tissue growth and differentiation. The initial stages involved a tendency for stabilization of epithelial growth and differentiation; malignant transformation involved very uneven differentiation of the same tissues. The epithelial changes observed in mice resembled those noted in the human cervical and vaginal epithelium in such diseases as cervical erosion or pseudoerosion, benign tumors and early cancer.

69-1151 STUDIES OF THE SIGNIFICANCE OF TUMOR ANTIGENS IN INDUCTION AND REPRESSION OF NEOPLASTIC DISEASES: PRESIDENTIAL ADDRESS. (E.) Law, L. W. (NCI, Bethesda, Md.). Cancer Res. 29(1):1-21, 1969. (98 references)

The natures and functions of the new virus-specific cell surface antigens induced by oncogenic viruses are discussed, with particular reference to the antigens detected by transplantation rejection methods ("TR" antigens) in mice with tumors induced by viruses containing DNA (adenovirus, papovaviruses) or RNA (leukemia-lymphoma-sarcoma group viruses).

69-1152 GOITER AND THYROID CANCER. (Fr.) Scazziga, B. R. (U. Lausanne, Switzerland). Praxis 57(47):1650-1655, 1968. (13 references)

The differential diagnosis of thyroid cancer and benign thyroid diseases is discussed, in view of the high incidence of thyroid cancer in the presence of hyperthyroidism (although the cancer incidence in toxic adenoma or Basedow's disease is low).

69-1153 ADDICTION TO TOBACCO SMOKING AND CANCER OF THE RESPIRATORY TRACT. (Pol.) Wiśniowska, J. (Zeromski Hosp., Cracow, Poland). Otolaryng. Pol. 22(5):753-758, 1968. (28 references)

The carcinogenic effects of tobacco are discussed with special emphasis on cancer of the mouth trachea, larynx, pharynx and bronchi.

69-1154 DOES THE FREQUENCY OF CANCERATION IN ULCERATIVE COLITIS JUSTIFY A PROPHYLACTIC PROCTOCOLECTOMY? (E.) Saegesser, F. (Fac. Med., Lausanne, Switzerland) and D. Waridel. Amer. J. Proctol. 20(1):33-44, 1969. (68 references)

In pts. with ulcerative colitis (particularly those developing colitis in childhood or adolescence), the risk of developing cancer of the colon or rectum is minimal in the first few yr., then increases to 20-30% after 10 yr. Because the cancer risk rises rapidly thereafter (by an estimated 4%/yr., to about 50-60% after 20-30 yr.), the authors recommend total proctocolectomy with terminal ileostomy after a 10-yr. delay (assuming adequate individual follow-up). Since 15-25% of the cancers secondary to ulcerative colitis develop in the rectum, an ileorectal anastomosis is not recommended. Segmental resection of the colon should be considered in only 2 cases: an old pt. with colitis predominantly of 1 segment, or a pt. with regional colitis appearing near a carcinoma of the colon. Four pts. who developed cancer 12-23 yr. (av. 18 yr.) after the onset of colitis, and 1 pt. who developed carcinoma of the colon after 3 inadequate operations over 20 yr., are described briefly.

69-1155 ENDOPLASMIC RETICULUM AND PHENOTYPIC VARIABILITY IN NORMAL AND NEOPLASTIC LIVER. (E.) Pitot, H. C. (U. Wisconsin, Madison). Arch. Path. (Chicago) 87(2):212-222, 1969. (43 references)

A mechanism for normal enzyme template stabilization and its changes in normal liver and hepatoma is proposed: a membrane-associated messenger RNA template (the "membron"), whose expression is affected by changes in the cellular environment. The stability of the membron is assumed to occur through an association of the messenger RNA molecule with structures in the mosaic of the endoplasmic reticulum. It is further postulated that changes in this membrane mosaic lead to heritable changes in the messenger RNA stability for specific enzymes.

69-1156 ETIOLOGY OF BURKITT'S LYMPHOMA ---AN ALTERNATIVE HYPOTHESIS TO A VECTORED VIRUS. (E.) Burkitt, D. P. (Extern. Sci. Staff Med. Res. Coun., London). J. Nat. Cancer Inst. 42(1):19-28, 1969. (80 references)

Evidence is presented to suggest the possible association of the Burkitt lymphoma with both chronic, endemic malaria (the malarial association determining the geographical distribution of the tumor) and some virus. It is suggested that tumor formation results from interaction of the virus(es) (perhaps the EB virus) and a RES already altered by chronic, heavy infection with malarial or other parasites.

69-1157 THE ROLE OF EXPERIMENTAL BIOLOGY AND TOXICOLOGY IN RENDERING THE HUMAN ENVIRONMENT SAFE. (E.) Eckardt, R. E. (Esso Res. Eng. Co., Linden, N. J.). Progr. Exp. Tumor Res. 11:213-221, 1969. (10 references)

69-1158 Advances in Immunology, Vol. 9. (E.) Dixon, F. J., Jr. and H. G. Kunkel (Eds.). Publ.: Academic Press, New York, 1968, 285 pp.

69-1159 CARCINOGENESIS. A CURRENT APPRAISAL. (E.) Paul, J. (Beatson Inst. Cancer Res., Glasgow, Scotland). Scot. Med. J. 13(10): 326-332, 1968.

69-1160 COMBINED ACTION OF CARCINOGENIC SUBSTANCES. (Rus.) Likhachev, A. Ia. (Sci. Res. Inst. Oncol., USSR Min. Health, Moscow). Vop. Onkol. 14(10):114-124, 1968. (87 references)

69-1161 SMOKING AND HEALTH (2): FUNCTIONAL AND STRUCTURAL CHANGES IN THE RESPIRATORY ORGANS. (Sw.) Birath, G. (Renstromska Hosp., Goteborg, Sweden). Lakartidningen 65(44):4345-4350, 1968. (3 references)

Toxic effects of tobacco smoke on the respiratory tract, and the relationships of smoking to lung cancer and other diseases, are discussed briefly.

69-1162 RELATIONSHIP BETWEEN ASBESTOSIS AND PLEURAL MESOTHELIOMA. CURRENT CONCEPTS. (It.) Carrata Thomes, A. (San Luigi Gonzaga Hosp., Turin, Italy) and A. Ferrari-Sacco. G. Ital. Mal. Torace 21(6)Suppl:75-82, 1967. (38 references)

After reviewing current knowledge on pleural mesothelioma and pulmonary asbestosis, the authors discuss the relationship between asbestosis and pleuropulmonary and extrapulmonary cancer (stomach, colon, rectum, peritoneum). The discussion of the possible carcinogenic effects of asbestos includes comments on crocydolite and amosite, the importance of air pollution in the area of asbestos industries, the importance of the presence of asbestos bodies, the mode of exposure, the pathway by which asbestos reaches the pleura, and the role of pleural hyaline plaques.

69-1163 THYROID CARCINOMA IN ATOMIC BOMB SURVIVORS, HIROSHIMA AND NAGASAKI. (E.) Wood, J. W. (Cornell U. Med. Coll, New York, N. Y.), H. Tamagaki, S. Neriishi, T. Sato, W. F. Sheldon, P. G. Archer, H. B. Hamilton and K. G. Johnson. Amer. J. Epidem. 89(1):4-14, 1969.

From December 1, 1963 to December 31, 1965, 13,117 adult residents of Hiroshima and Nagasaki (4865 men, 8252 women) were surveyed, disclosing 39 cases of thyroid carcinoma (7 men, 32 women) and 386 of other thyroid abnormalities (nontoxic goiter in 298/386); 12 additional cases of thyroid cancer were seen in members of the sample (comprising nearly 20,000 persons in all) who were not examined during this period. Thyroid cancer occurrence rates (number/1000 persons examined) in the sample group were 1.2 in men and 3.6 in women in Hiroshima, compared to 1.8 and 4.6, resp., in Nagasaki. This sex ratio (about 3 females:1 male) held only for those who were exposed to the atomic bomb at the age of 20 and over. In the youngest group (under 20 at the time of exposure, under 40 at the time of examination), the sex difference almost disappeared (occurrence rates were 3.3 in men and 4.3 in women); in fact, 5/7 of the thyroid cancers observed in males were seen in men of the youngest group who had been less than 1400 m from the hypocenter (in this group, the occurrence rates were 9.7 in men and 10.7 in women). The sample included 1156 men and 1945 women who had not been in Hiroshima or Nagasaki at the time of the atomic explosion, or had been over 10,000 m from the hypocenter; 1/1156 men and 4/1945 women had thyroid cancer. Thyroid cancer occurrence rates were 0.4 in males and 2.0 in females who were not in the city at the time of the explosion, or had been exposed over 3000 m from the hypocenter. In persons exposed within 2000 m of the hypocenter, thyroid cancer occurrence rates increased with the estimated radiation dosage; this increase was significant in women, but the number of cases in men was too small for statistical evaluation. The thyroid cancer did not show an aggressively malignant course; 16 pts. died with thyroid cancer, but death was not attributed to the cancer in any of these pts.

69-1164 MULTIPLE PAGET-TYPE EPITHELIOMAS APPEARING IN AN AREA PREVIOUSLY HEAVILY IRRADIATED BY X-RAYS. (Fr.) Colomb, D. and D. David. Lyon Med. 219(52):1857, 1968.

An 18-yr.-old woman with lumbar pain and sciatica of undetermined type (no spinal anomalies were noted on X-ray) was treated for 2 yr. with radiotherapy (RT; 32 sessions; doses not stated). No radiodermatitis developed. A pigmented tumor developed at the site of lumbosacral RT 22 yr. after the last dose of RT (age 42 yr.); 8 yr. later it was identified as a superficial basal cell carcinoma (Paget type). RT was begun (unspecified dose; radiodermatitis developed), but the pt. refused further treatment and was lost to follow-up for the next 12 yr. At the time of admission (age 62 yr.), multiple carcinomas of the same type were seen on the lumbosacral skin. No other tumors were found.

69-1165 FIBROSARCOMA OF BONE. A STUDY OF 114 CASES. (E.) Dahlin, D. C. (Mayo Clin. Found., Rochester, Minn.) and J. C. Ivins. Cancer 23(1):35-41, 1969.

Before 1968, 114 pts. with verified primary fibrosarcomas of bone were seen (excluding 20-30 pts. with fibrosarcoma of the maxillary antral region). The series including these pts. also included about 370 chondrosarcomas (including several with areas of secondary fibrosarcoma) and about 700 osteogenic sarcomas (23% showing predominantly fibroblastic components). The pts. with fibrosarcoma included 53 males and 61 females; only 1/114 was under 10. Predisposing conditions were noted in 34/114 (30% of the group). Fibrosarcomas developed in 4 giant cell tumors of the bone, 1 possible giant cell tumor, 2 pagetoid bones, 1 area of osteomyelitis and 3 mandibular fibromas (2 ameloblastic fibromas and 1 desmoplastic fibroma, accounting for 3/13 of the mandibular fibrosarcomas). The other 23 fibrosarcomas developed in bones previously treated with radiotherapy (RT; usually high doses) for giant cell tumors (8), aneurysmal bone cyst (1), fibrous dysplasia (1), benign osteoblastoma (1) or unverified bone lesions (6); 6 fibrosarcomas developed in areas of bone in the line of RT for non-osseous lesions (including 2 fibrosarcomas of the skull bones after RT for presumed brain tumors). In the pts. treated with RT for giant cell tumors, fibrosarcomas developed 3.5-38 yr. later (av. 10.6 yr.); in the other 15 pts., fibrosarcomas developed 4-29 yr. after RT (av. 14.5 yr.). The pts. with fibrosarcoma developing from pre-existing lesions had about the same chance of survival after adequate therapy as did the pts. without pre-existing lesions.

69-1166 MALIGNANT TRANSFORMATION OF IRRADIATED JUVENILE LARYNGEAL PAPILLOMA. (Ger.) Maier, I. (U. Halle-Wittenberg, Germany). Z. Laryng. Rhinol. Otol. 47(11):862-869, 1968.

Two children with laryngeal papillomatosis (diagnosed at age 3-4 yr.), treated with radiotherapy (RT) during childhood, developed squamous cell carcinoma in adulthood. One pt. (a boy) was treated with 3 courses of RT (total 6600 r) at age 10-11 yr. and developed carcinoma 13 yr. after the first dose of RT; the other (a girl), received RT (4000 r, 2 courses) at age 4.5 yr. and developed carcinoma nearly 19 yr. later.

Both pts. had also been treated with podophyllin (doses not stated); neither had responded to attempts to induce active immunity (using papilloma antigens), methionine (1/2) or local estrogen therapy (1/2). The female pt. had been pregnant about 3 yr. before the diagnosis of carcinoma, but the pregnancy had not affected the course of disease. It is concluded that RT should not be admin. to children with laryngeal papillomatosis.

69-1167 CELL POPULATION ANALYSIS OF RADIATION LEUKEMOGENESIS IN MICE. (E.) Sato, C. (Tohoku U. Sch. Med., Sendai, Japan). Tohoku J. Exp. Med. 96(1):97-109, 1968.

Differential cell counts were studied in thymus and lymph node cell suspensions from young C57BL/6 mice (32 ± 3 days old; both sexes) for up to 200 days after the beginning of treatment with leukemogenic doses of irradiation (170 or 260 r x 4 at 7-day intervals). Normal differentiation of large lymphocytes to small lymphocytes was seen after each radiation dose, but accumulation of blast cells (resulting from maturation arrest) was not noted during the entire regeneration period. Tumor cells appeared among the normal lymphocytes as early as 14 days after the end of irradiation; the rate of tumor cell induction during irradiation was 10^{-4}-10^{-5}/r in the blast cells. Self-replicating cells increased exponentially with a 7.3-day doubling time, forming a large thymoma. The lymph nodes showed many foci of unusual blast cell proliferation (without differentiation) in the cortex, but no further development of these foci was noted. It is suggested that tumor cells developed in the thymus because of its immunological insufficiency.

69-1168 OXYGEN SUPPLY AND NEOPLASTIC CONVERSION OF MOUSE EMBRYO CELLS IN VITRO. (E.) Sanford, K. K. (NCI, Bethesda, Md.) and R. Parshad. J. Nat. Cancer Inst. 41(6):1389-1394, 1968.

In dissociated C3Hf mouse embryo cells, carried in cultures exposed to continuous intermittent gassing with mixtures containing different conc. of O_2, no cell growth was seen at the highest O_2 conc. (60%). At 40% O_2, growth was retarded at first, but later a more rapidly growing line was seen. Cultures exposed to 40% or 1-2% O_2 showed about the same rate of neoplastic conversion (into cell lines inducing sarcomas in C3Hf mice or compatible hybrids).

69-1169 EXPERIMENTAL STUDIES ON THE RELATION BETWEEN SCARS AND TUMORIGENESIS. (E.) Hongo, T. (Hirosaki U., Japan). Hirosaki Igaku (Hirosaki Med. J.) 20(1):51-53, 1968.

In dd strain mice, a 5-wk. course of skin painting with 3-methylcholanthrene (MC; 2 applications/wk. of 0.25% benzene soln.) induced skin papillomas (within 8 mo.) in about 40% of the group. In subsequent experiments, 3 groups of mice were painted with MC (same doses) and 2 areas of the skin (of the back) were burned. When MC was applied shortly after burning, the papilloma incidence at the healed site was the same as in control mice. When burns were inflicted shortly after MC application, papillomas regularly developed on the scar tissue. When burns were inflicted 3-5 mo. after MC application, the incidence of papillomas was low, but the tumors developed only on the burn scars. The results indicated that burn injuries predisposed to tumor development in MC-treated areas of the skin; this was not considered analogous to the formation of scar tissue cancer, however, since such tumors usually develop in scar tissue of many yr. duration.

69-1170 CHROMOSOMAL ABERRATIONS AND NEOPLASTIC POTENTIALITIES OF THYMUS CELLS DURING LEUKEMOGENESIS. (E.) Lagerlöf, B. (Karolinska Inst., Stockholm). Acta Haemat. (Basel) 40(3): 142-153, 1968.

Chromosomal morphology was studied in various stages of tumor development in C57Bl/Ka mice with thymic lymphomas induced by leukemogenic doses of ^{60}Co irradiation (total dose, 680 rads in 4 doses), or by inoc. of cell-free filtrates (presumably containing a virus) from these radiation-induced tumors. In both cases, chromosomal abnormalities usually consisted of minor aneuploidy (most tumors were hyperdiploid; only 1 was tetraploid) and chromatid breaks; no markers were observed. Chromosomal aberrations were more common in the radiation-induced tumors than in the virus-induced tumors; in the radiation-induced tumors, they seemed to be induced by the radiation, but were not primarily involved in the leukemogenic process itself. In the virus-induced tumors, the frequency of chromosomal aberrations increased in the advanced stages. In both cases, no significant correlation between the presence of chromosomal abnormalities and the development of tumor autonomy (transplantability) was seen.

69-1171 EFFECTS OF RADIATION DAMAGE TO BONE MARROW ON SUSCEPTIBILITY OF CHICKS TO ERYTHROLEUKEMIA VIRUS. (E.) Chi, C. H. (Karolinska Inst., Stockholm) and B. Lagerlöf. Acta Radiol. [Ther.] (Stockholm) 7(5):353-363, 1968.

The effects of ^{60}Co radiation (1 dose of 600 rads at age 1 day) on the susceptibility of random-bred White Leghorn chicks to erythroleukemia virus (ELV; 0.2 ml i.v. of a lyophilized pool of medium from cultured erythroleukemic bone marrow) were studied. In chicks inoc. with ELV on day 2, 8 or 20 after irradiation, mortality rates (7/10, 8/12 and 7/12, resp.) were the same as in non-irradiated controls inoc. with

ELV at the same ages (7/10, 8/11 and 7/12, resp.). However, a significant correlation was seen between leukemia mortality and the extent of radiation-induced bone marrow damage (determined by biopsy before ELV inoc.). Mortality rates were significantly higher in irradiated chicks with slight bone marrow damage and those showing histological signs of erythroid regeneration at the time of ELV inoc. (17/21 and 17/25) than in those with advanced bone marrow damage and no signs of erythroid regeneration (4/13 and 4/9, resp.). It is concluded that irradiation, by removing the virus-susceptible target cells, enhances the resistance to ELV.

69-1172 LEUKEMIA IN A RHESUS MONKEY (Macaca mulatta) FOLLOWING EXPOSURE TO WHOLE-BODY PROTON IRRADIATION. (E.) Siegal, A. M. (USAF Sch. Aerospace Med., Brooks AFB, Tex.), H. W. Casey, R. W. Bowman and J. E. Traynor. Blood 32(6):989-996, 1968.

The third reported case of radiation-induced leukemia in a subhuman primate is described. This rhesus monkey received a relatively low radiation dose (100 rads) and developed acute granulocytic leukemia 32 mo. later. Cytoplasmic crystalloids, indicating a viral infection, were seen in leukemic and normal cells from this animal, but their relationship to the leukemia was unknown. This animal was the only monkey of a group of 123, exposed to 25-1200 rads of proton irradiation, that developed any signs of leukemia (the number of animals surviving the acute toxic stage is not stated).

69-1173 RADIOSENSITIVITIES OF CELLS FROM WHICH RADIATION-INDUCED SKIN TUMOURS ARE DERIVED. (E.) Hulse, E. V. (Med. Res. Coun., Harwell, Didcot, England), R. H. Mole and D. G. Papworth. Int. J. Radiat. Biol. 14(5):437-444, 1968.

The observed incidence of epidermal and dermal tumors (90% and 80%, resp., were malignant), induced in female CBA/H mice by a single dose of β-irradiation, was accounted for by assuming that tumor induction was proportional to the square of the dose, and that potential tumor cells lost their reproductive integrity according to a Type C cell survival curve.

69-1174 OCCUPATIONAL RADIODERMATITIS IN PHYSICIANS. (Sp.) De Dulanto, F. (U. Granada, Spain) and R. Castilla-Pertiñez. Actas Dermosif. (Madrid) 59(5-6):369-378, 1968.

Case histories are given of 8 physicians who developed radiodermatitis after 2-6 yr. (3/8), 9-10 yr. (4/8) or 15 yr. (1/8) of professional exposure to X-rays, without adequate protection. Two physicians developed radiodermatitis of the fingers after 9-10 yr. of exposure, then developed basal cell (1/2) or spinocellular (1/2) carcinoma on areas of radiodermatitis after 27-31 yr. of exposure. One pt. (a radiologist) used a protective cream after developing radiodermatitis, but this did not prevent the development of carcinoma. In both cases, the X-ray equipment used was described as old.

69-1175 SKIN CANCER AS AN OCCUPATIONAL DISEASE IN RURAL AREAS. (Sp.) De Dulanto, F. (U. Granada, Spain), J. Sanchez Muros, M. Armijo and A. Martin Gomez. Actas Dermosif. (Madrid) 59(5-6):309-318, 1968.

Of 7529 pts. with cancer seen from 1955-1967, 688 (9.01%) showed basal cell (441) or spinocellular (247) carcinoma of the skin (excluding tumors of the dermal papillary mucosa, possibly caused by injuries or chemicals). The group included 355 women and 333 men (the female excess was not significant), with a peak incidence at age 60-69 yr.; 593/688 (90%) were agricultural workers and 95/688 were of other occupational groups. The majority of pts. had light blue eyes (73%), fair or brown hair (23% and 46%, resp.) and fair complexions (83%); 24 pts. were albinos. Nearly all of the tumors (92%) developed on skin exposed to the sun, particularly the face; 86% of the tumors (593/688) developed on areas of chronic actinic dermatitis. The sequence of actinic dermatitis--keratitis--spinocellular carcinoma was evident; in basal cell carcinomas, solar irradiation apparently had a cocarcinogenic effect. Medicolegal problems of solar cancer of the skin (considered an occupational disease of farmers in Spanish law) are briefly discussed.

69-1176 LUNG CANCER FOLLOWING ATOMIC RADIATION. (E.) Wanebo, C. K., K. G. Johnson (Cornell U. Med. Coll., New York, N. Y.), K. Sato and T. W. Thorslund. Amer. Rev. Resp. Dis. 98(5):778-787, 1968.

Lung cancer incidence and mortality rates were studied in 108,919 exposed and non-exposed residents of Hiroshima and Nagasaki (the Life Span Study group), and in 19,962 exposed and control persons from this group (the Adult Health Study group). Over a 16-yr. period (October 1, 1950-September 30, 1966), 16,406/108,919 persons died, 188 of lung cancer. The observed/expected (O/E) ratios of death certificate and autopsy diagnoses of lung cancer in persons exposed to 90 rads or more were 1.9/1 and 2.15/1, resp. In the smaller group, 66 confirmed cases of lung cancer were found during the same period; O/E ratios in persons exposed to 90 rads or more, or to less than 90 rads, were 1.6/1 and 0.9/1, resp. This increased lung cancer risk was similar to that reported for pts. undergoing radiotherapy for ankylosing spondylitis. Unlike the leukemogenic effect of radiation, the effect on lung cancer apparently began in about 1955 and is still continuing undiminished. Statistical analysis of a small group of pts. indicated an increased lung cancer risk in smokers (both sexes). No significant differences were seen between heavily exposed pts. and other pts. with lung cancer, with respect to age at onset, presence of other primary tumors, tumor type, or other factors commonly associated with an increased lung cancer risk (smoking, occupation and tuberculosis).

69-1177 TRAUMATIC CHONDROSARCOMA OF THE KNEE JOINT. (Pol.) Witwicki, T. (Acad. Med., Warsaw) and A. Dziak. Wiad. Lek. 21(19): 1769-1773, 1968.

Two men and 2 women with intrascapular and periarticular post-traumatic chondrosarcomas of the knee joint are described. The tumors were excised about 3.5-7 mo. after the injuries to the affected knee in 3/4; in 1/4, the interval between the injury and the first surgical procedure was 3 yr. At least 2 of these tumors were identified at first as chondromas, and X-ray examination showed no malignancy in 3/4, but the clinical and histological features of 4/4 tumors led to the diagnosis of highly malignant chondrosarcomas.

69-1178 THYROID CARCINOMA ASSOCIATED WITH RADIATION THERAPY. (E.) Harper, P. V. (U. Chicago Sch. Med., Ill.) and D. Paloyan. Surg. Clin. N. Amer. 49(1):57-60, 1969.

Examination of the records of an unspecified number of pts. treated by radiotherapy to the neck, face and upper thorax from 1938-1967, disclosed 47 pts. (10 males, 37 females) who later developed thyroid carcinoma. This group included no pts. with anaplastic carcinoma and only 1 with Hürthle cell carcinoma; 55% of the tumors were papillary carcinomas. The age at onset of thyroid cancer was up to 20 yr. in 23/47 (48%; 7 pts. were up to 10 yr. old); only 10/47 (21%) were over 30. The age at the time of X-irradiation (100-800 r; estimated av. dose 150 r) was up to 4 yr. in 24/47 (51%), 4-15 yr. in 15/47 (32%) and over 15 yr. in 8/47 (17%); cancer developed 1-25 yr. (av. 12 yr.) after irradiation. Radiotherapy had been directed to the thymus in 11/47 (23%), to the tonsils in 17/47 (36%), to the face in 13/47 (28%; for the treatment of acne), and to other sites in 6/47 (13%). The dangers of such irradiation in infancy, childhood and adolescence are discussed.

69-1179 PLUTONIUM-238 IN FALLOUT. (E.) Mamuro, T. (Radiat. Ctr. Osaka Pref., Japan) and T. Matsunami. Science 163(3866): 465-467, 1969. (7 references)

See also abstract nos.: 1127,1135,1136,1140,1216,1305

69-1180 TUMORIGENESIS ON MINERAL-DEFICIENT TOMATO PLANTS. (E.) Swain, L. W. (Rutgers Coll., New Brunswick, N. J.) and J. P. Rier, Jr. Cancer Res. 28(12):2496-2501, 1968.

In Agrobacterium tumefaciens-inoc. tomato plants grown in complete or incomplete nutrient soln., the absence of nitrogen, phosphorus and calcium (in that order) was most effective in reducing tumor proliferation.

69-1181 COMPOSITION AND PREPARATION OF EXPERIMENTAL INTRAVENOUS FAT EMULSIONS. (E.) Schurr, P. E. (Upjohn Co., Kalamazoo, Mich.). Cancer Res. 29(1):258-260, 1969.

Methods for the preparation of 3-6-kg lots of 7,12-dimethylbenzanthracene (DMBA) and other carcinogens in fat emulsions suitable for i.v. inj. (to induce mammary cancer and leukemia in animals) are described. The composition of 1 such 6-kg lot was: cottonseed oil 900 g (15.0%, wt./wt.), purified soybean lecithin 72 g (1.2%), Pluronic F-68 18 g (0.3%), DMBA 30 g (0.5%), and water for inj. 4980 g (83.0%).

69-1182 INTERACTION BETWEEN CARCINOGENIC HYDROCARBONS AND NUCLEOSIDES. (E.) Harvey, R. G. (U. Chicago, Ill.) and M. Halonen. Cancer Res. 28(11):2183-2186, 1968.

The formation of donor-acceptor complexes between 51 polycyclic aromatic hydrocarbons (PAH) and substances of biological importance was studied by chromatography of the PAH on thin layers of inert adsorbents impregnated with the biological substances. Caffeine had the strongest affinity for PAH, followed by riboflavin-5'-phosphate, adenosine, thymidine, uridine and guanosine (in decreasing order). Little or no binding was seen with tryptophan, except with PAH of the largest molecular size. Potent PAH carcinogens (3-methylcholanthrene, 3,4-benzpyrene, 7-methylbenzanthracene, 7,12-dimethylbenzanthracene) were bound moderately well by adenosine, caffeine and riboflavin, but the strength of PAH binding was related more to the number of fused aromatic rings than to the carcinogenicity of the compounds.

69-1183 PHYSIOLOGIC ACTIVITY OF SOME FUNGAL ESTROGENS PRODUCED BY Fusarium. (E.) Mirocha, C. J. (U. Minnesota, St. Paul), C. M. Christensen and G. H. Nelson. Cancer Res. 28(11):2319-2322, 1968.

Fusarium graminearum, grown on natural corn or rice substrate, produced at least 5 substances with estrogenic activity; 1 of these (F-2) was identified as 1 of the enantiomorphs of zearalenone, the others had not been completely characterized at the time of report. F-2 caused marked uterotrophic responses in rats, mice, guinea pigs and young swine. In mice, F-2 was 0.00063 times as active as estrone after s.c. admin. and 0.01 times as active as estrone after p.o. admin. (suggesting that its activity may be due to some intermediate). F-2 had some myotrophic activity in the mouse perineal muscle bioassay; it was not as active as diethylstilbestrol in this respect. Infertility in dairy cattle was also traced to F-2 in moldy hay (chemical extraction yielded 14 ppm of F-2). In tobacco pith callus tissue in vitro, F-2 had slight growth-stimulating effects at low conc. and inhibitory effects at higher conc. (2.5 µmoles/liter and over). F-2 stimulated the sexual cycle of various fungi at low conc. and inhibited it at higher conc., but did not inhibit vegetative growth in most cases.

69-1184 TOXICOLOGIC RESEARCH ON SUBSTANCES FROM Fusarium nivale. (E.) Tatsuno, T. (Inst. Phys. Chem. Res., Yamato-Machi, Saitama, Japan). Cancer Res. 28(11):2393-2396, 1968.

A new toxic substance of unknown structure, designated nivalenol (N), was isolated by column chromatography from moldy rice infected with Fusarium nivale; thin-layer chromatography of the crude extract yielded 10 fractions. N inhibited protein synthesis (rabbit reticulocytes) and DNA synthesis (HeLa cells and unspecified ascites tumor cells), but did not affect RNA synthesis. In ddS mice, the i.p. LD_{50} of N was 40 µg/10 g. The toxic effects of N included cell degeneration in the bone marrow, lymph nodes, thymus, intestine and testes; in vitro and in vivo, N showed radiomimetic effects.

69-1185 THE MUTAGENIC ACTION OF CAFFEINE IN HIGHER ORGANISMS. (E.) Kuhlmann, W. (U. Munster, Germany), H.-G. Fromme, E.-M. Heege and W. Ostertag. Cancer Res. 28(11):2375-2389, 1968.

Caffeine (C) induced dominant lethal mutations in male C57BL mice after chronic treatment. After exposure to C, Drosophila larvae showed a significant change in the sex ratio in the survivors (52.6% of untreated controls and only 47.1% of the treated larvae were males). Other experiments in Drosophila indicated C induction of both dominant and recessive sex-linked lethals; it is suggested that the observed somatic chromosome damage might be associated with premature aging. In human cells in vitro (WBC and HeLa cells), C induced chromatid breakage (the breaks did not rejoin and usually were not rearranged) during DNA synthesis, with premutations in about the same amounts throughout the cell cycle. The chromatid breakage was proportional to the C dose at the lower conc., but was not dependent on the total duration of exposure. If these data can be extrapolated to interpret the mutagenic effects of C in man, the calculated total amount of C-induced genetic damage would be in the neighborhood of the natural mutation rate, making C one of the most dangerous of the human mutagens. C-induced mutagenic damage could accumulate in men, but almost no genetic damage would be induced in women after birth (since DNA replication of the female germinal cells ends at birth). Studies of the effects of C on aging and tumor development are recommended.

69-1186 CARCINOGEN-INDUCED TUMORS OF THE THYMUS. I. RESTORATION OF NEONATALLY THYMECTOMIZED MICE WITH A FUNCTIONAL THYMOMA. (E.) Stutman, O. (U. Minnesota Med. Sch., Minneapolis), E. J. Yunis and R. A. Good. J. Nat. Cancer Inst. 41(6):1431-1452, 1968.

Transplantation of a nonlymphoid thymoma, induced by intrathymic inj. of 7,12-dimethylbenzanthracene (0.1 mg) in a newborn Strain A mouse, resulted in immunological restoration (measured as allograft immunity and graft-versus-host reactivity) in neonatally thymectomized syngeneic or allogeneic mice. This biological activity was specific for the functional thymoma (other thymic and nonthymic tumors were inactive in this respect); this functional thymoma lost its biological activity after repeated transplantation. The lymphoid elements seen within the thymoma in the syngeneic graft-host combination probably reflected an immune reaction induced by the antigenicity of the tumor.

69-1187 INDUCTION OF INCREASED BENZPYRENE HYDROXYLASE ACTIVITY BY 2-PHENYLBENZOTHIAZOLES AND RELATED COMPOUNDS. (E.) Wattenberg, L. W. (U. Minnesota Med. Sch., Minneapolis), M. A. Page and J. L. Leong. Cancer Res. 28(12):2539-2544, 1968.

Benzpyrene hydroxylase (BPH) induction was studied in liver and lung tissue from female Sprague-Dawley rats, obtained 48 hr. after admin. of the inducing compound (0.1 mmole in 1 ml dimethylsulfoxide, p.o.). Structure-activity relationships were evaluated for a series of 33 compounds. The BPH-inducing activity of unsubstituted 2-phenylbenzothiazole was approx. doubled by introduction of an appropriate halogen into the 4'-phenyl position; other substitutions and modifications resulted in smaller increases or (in some cases) reduction or total loss of BPH-inducing activity. Most compounds of this series had similar BPH-inducing activities in the lung and liver, but others did not. Of the more potent inducers, the compound showing the greatest selective effect was 2-(4'-cyanophenyl)benzothiazole (its inducing activity in lung was more than double the activity seen in liver).

69-1188 REGRESSION OF ESTRONE-INDUCED MAMMARY TUMORS IN THE RAT. (E.) Cutts, J. H. (U. West. Ontario, London, Canada) and G. C. Froude. Cancer Res. 28(12):2413-2418, 1968.

In a strain of hooded rats, hysterectomized shortly after weaning (the ovaries remained intact), s.c. implantation of pellets containing estrone (8-10 mg) at age 21-40 days induced mammary fibroadenomas, adenocarcinomas and a few carcinomas (this last group was excluded from the experiment). When the tumors had reached diameters of about 3-4 cm, the estrone pellets were removed. This was followed by prompt and complete regression of the adenocarcinomas (though not of the fibroadenomas); the tumors did not recur in the absence of further exogenous estrogens. Regression of the adenocarcinomas (which was complete after 8 wk.) was accompanied by shrinkage of the cells, a decrease in the number of dividing cells, and increased nuclear pyknosis.

69-1189 SOMATIC CELL LESIONS INDUCED BY THE BASE ANALOG 5-BROMODEOXYURIDINE. (E.) Rizki, R. M. (U. Michigan, Ann Arbor) and T. M. Rizki. Cancer Res. 29(1):201-208, 1969.

Drosophila larvae, fed nonlethal doses of 5-bromo-2'-deoxyuridine (BUDR) + 5-fluorouracil (FU; admin. to inhibit thymidylate synthesis), showed a variety of morphological changes of the wings, legs and bristles following emergence from the pupa stage. Supernumerary structures on the wings were not accompanied by changes in wing size, indicating that the supernumerary structures resulted from additional growth (not reorganization) of the normal cell population of the wing during pupal metamorphosis. The BUDR dose-response curves indicated a limited number of targets that could respond as supernumeraries or single cell bristle effects on the wings; the target size may have been determined by the population size of the underlying mesenchymal cells. It is concluded that BUDR incorporation into DNA constituted a mutation at the level of genetic information; under the conditions of this experiment, this indicated a somatic mutation, underlying the modified growth patterns noted. The neoplastic changes induced by BUDR + FU were not correlated with increased mortality or specificity for developmental stage or strain.

69-1190 ELEVATED LEVELS OF α-GLOBULINS IN SERA FROM GERMFREE RATS WITH 3-METHYLCHOLANTHRENE-INDUCED TUMORS. (E.) Zacharia, T. P. (U. Notre Dame, Indiana) and M. Pollard. J. Nat. Cancer Inst. 42(1):35-38, 1969.

In germfree Sprague-Dawley rats with tumors (fibrosarcomas) induced by s.c. inj. of 3-methylcholanthrene, mean serum α-globulin levels were higher than in non-tumor-bearing germfree controls. The second fraction (A2) in the α-globulin zone of sera from the tumor-bearing rats was not seen in sera from controls. Mean total α-globulin levels fell to normal 3 wk. after the tumors were removed surgically; the A2 fraction in the α-globulin zone fell significantly in these rats, but did not disappear completely. It is suggested that the α-globulin fraction was either produced by the tumor cells, or was produced in response to tumor growth in the host liver.

69-1191 EPIDERMAL HYPERPLASIA INDUCED BY 7,12-DIMETHYLBENZ(α)ANTHRACENE IN PROSIMIANS. (E.) Adachi, K. (Oregon Reg. Primate Res. Ctr., Beaverton), S. Yamasawa and W. Montagna. J. Nat. Cancer Inst. 42(1):61-68, 1969.

After 4-5 wk. of skin painting with 7,12-dimethylbenzanthracene (in acetone, using dodecylbenzene as a cocarcinogen), 15 adult animals (both sexes) belonging to 2 genera of lower primates developed typical pseudoepitheliomatous (pseudocarcinomatous) hyperplasia of the skin. Associated biochemical changes included significant increases in the enzymes of the Embden-Meyerhof pathway, the pentose and tricarboxylic acid cycles, and glycogen metabolism; increases in the enzymes linking carbohydrate and amino acid metabolism were insignificant. Because the development of pseudocarcinomatous skin hyperplasia was accompanied by severe side effects, carcinogen painting was stopped after 9 wk. However, 6/7 animals of 1 species (*Perodictius potto*) died of complications; the other animal and 8/8 of the other species (*Galago crassicaudatus*) survived. After about 2 yr. of observation, only 3 apparently benign tumors (1 papilloma and 2 keratoacanthomas) had developed (all in *G. crassicaudatus*).

69-1192 THE ANTIGENICITY AND IMMUNOGENICITY OF CELL-FREE EXTRACTS OF CHEMICALLY INDUCED MURINE SARCOMAS. (E.) Pilch, Y. H. (NIH, Bethesda, Md.). Cancer Res. 28(12):2502-2511, 1968.

Cell-free extracts from 2 s.c. fibrosarcomas, 1/2 induced by ethiodol (EI) in a female BALB/c mouse, and 1/2 (designated MC-1) induced by methylcholanthrene in a female C3H/HeN mouse, induced antitumor isoimmunity in female mice of the same 2 strains. The degree of immunity depended on the length and intensity of immunization, the route of immunization (best results were seen with s.c. immunization), and the size of the tumor cell challenge inoculum. Immunized animals showing significant tumor immunity also showed circulating antibodies in low titer; both the immunity and the antibodies persisted at least 4.5 mo. Circulating antibodies were not seen in controls, or in immunized mice not developing significant tumor immunity. Extracts of normal BALB/c or C3H/HeN tissue did not induce tumor immunity. BALB/c mice immune to 1 EI-induced sarcoma were not resistant to transplants of another EI-induced sarcoma from a BALB/c mouse. C3H/HeN mice immune to MC-1 were not resistant to a transplanted mammary carcinoma (Sp-1) from a C3H/HeN mouse. Antibodies to the MC-1 tumor in C3H/HeN mice did not cross-react with antigens from the Sp-1 tumor.

69-1193 THE INHIBITORY EFFECT OF GRISEOFULVIN ON THE "PROMOTION" OF SKIN CARCINOGENESIS. (E.) Vesselinovitch, S. D. (U. Chicago Sch. Med., Ill.) and N. Mihailovich. Cancer Res. 28(12):2463-2465, 1968.

Skin tumors were induced by topical applications of 3,4-benzpyrene (BP; total dose 240 μg in 6 doses over 3 wk.), and promoted by croton oil (CO; total dose 0.0048 ml of 0.3% acetone soln. over 40 wk.) and/or griseofulvin (G; total dose 64 mg over 40 wk.), in random-bred female Swiss mice. In mice admin. BP followed by CO only, the tumor incidence (at 60 wk.) was 57%. When this 2-stage treatment was modified by treatment with G, admin. either 4 hr. or 24 hr. prior to each dose of CO, the tumor incidence fell to 20% and 23%, resp. No tumors developed in mice treated only with G or vehicle (acetone) during the second stage of the experiment. It is concluded that G inhibited skin tumor promotion by CO, but lacked promoting activity by itself.

69-1194 OBSERVATIONS ON CHEMICALLY INDUCED REGRESSING TUMORS OF MOUSE EPIDERMIS. (E.) Frei, J. V. (U. Western Ontario, London, Canada) and W. F. Kingsley. J. Nat. Cancer Inst. 41(6):1307-1313, 1968.

The rate of regression of skin tumors, induced in adult Swiss mice by repeated applications of 7,12-dimethylbenzanthracene (DMBA) in a 1-stage experiment, was lower than the regression rate in mice with tumors induced by 1 dose of DMBA followed by repeated applications of enhancing agents (2-stage experiments). In 2-stage experiments, the tumor regression rate was proportional to the duration of the experiment (it was markedly increased by a shortened period of enhancement) and to the tumor yield; it was affected by the site of treatment, but not by the enhancing agent (croton oil was used in most experiments; some experiments used Tween-60, turpentine, toluene, mineral oil or oil of sweet orange). Since the individual tumors showed varying abilities to sustain continued growth under different experimental conditions, it is suggested that the mechanism of regression of these tumors was the initial potential tumor focus induced by DMBA. These foci showed variable potential responsiveness to nonspecific growth stimuli, possibly based on individual tumor antigens and/or somatic mutations.

69-1195 EFFECTS OF HYDROXYUREA ON DNA AND RNA SYNTHESIS IN MOUSE SKIN, LIVER, AND THYMUS AND ON SKIN TUMORIGENESIS INITIATED BY β-PROPIOLACTONE. (E.) Smith, H. C. (U. North Carolina, Chapel Hill), R. K. Boutwell and V. R. Potter. Cancer Res. 28(11):2217-2227, 1968.

DNA and RNA synthesis in various tissues were studied by precursor incorporation (^{3}H-labeled thymidine and uridine, resp.) in female STS and Charles River CD mice (6-8 wk. old) during and after treatment with hydroxyurea (HU; 5 mg every 45 min. x 12 hr. i.p.). DNA synthesis in skin, thymus and liver fell to 5%, 5% and 25% of control values, resp., during HU treatment; after the end of treatment, DNA synthesis returned to normal within 3-5 hr. in skin and liver, but the process of recovery was slower and more complicated in thymus. RNA synthesis in these tissues during HU admin. remained essentially unchanged; during the recovery period, HU had little direct effect on RNA synthesis. Doses of HU sufficient to block DNA synthesis for 12-15 hr. had little or no effect on skin tumor initiation by β-propiolactone (admin. 20 or 2 hr. before, or 1 or 24 hr. after, the last inj. of HU).

69-1196 THYROIDITIS IN RATS INJECTED SUBCUTANEOUSLY WITH 3-METHYLCHOLANTHRENE. (E.) Reuber, M. D. (NCI, Bethesda, Md.) and E. L. Glover. Proc. Soc. Exp. Biol. Med. 129(2):509-511, 1968.

A single s.c. inj. of 3-methylcholanthrene (4 mg at age 12 wk.) induced mild or moderate thyroiditis in 3/14 male and 10/13 female Buffalo strain rats (evaluated at sacrifice, 22 wk. after treatment). Thyroid enlargement in animals with thyroiditis was more pronounced in females than in males. Leiomyomas of the s.c. tissue developed in 4/10 females and 1/3 males with thyroiditis, and 2/3 females and 2/11 males without thyroiditis; s.c. leiomyosarcomas developed in 3/10 females and 2/3 males with thyroiditis, and 1/3 females and 7/11 males without thyroiditis. There was no apparent correlation between the development of thyroiditis (which resembled that induced in rats by homologous or heterologous thyroid extract or by thyroglobulin) and the development of s.c. tumors. The mechanism of induction of thyroiditis is not known. No s.c. tumors or thyroiditis developed in vehicle (corn oil)-treated male or female controls.

69-1197 TUMOR PROMOTION BY 1-FLUORO-2,4-DINITROBENZENE, A POTENT SKIN SENSITIZER. (E.) Bock, F. G. (Roswell Park Mem. Inst., Buffalo, N. Y.), A. Fjelde, H. W. Fox and E. Klein. Cancer Res. 29(1):179-182, 1969.

The effects of 1-fluoro-2,4-dinitrobenzene (DNFB) were studied in several groups of mice (strains Swiss, BALB/c or C57BL/6) admin. 1 topical dose of 7,12-dimethylbenzanthracene (DMBA; 125 µg). In mice admin. 5 topical doses/wk. of 0.1% DNFB (in acetone soln.), skin tumors developed in only 4 wk. in some cases; after 38 wk., the tumor incidence was 70% (21/30 Swiss mice). This dose of DNFB was highly toxic; lower conc. (0.03%) induced tumors in 38% of 21 evaluable DMBA-treated Swiss mice. The C57BL/6 mice developed fewer tumors than the Swiss or BALB/c mice after treatment with DMBA followed by either DNFB or croton oil. The lysine conjugate of DNFB was not a tumor promoter. DNFB alone did not induce tumors. The results suggested a relationship between tumor promotion and disturbances of the immune mechanism in sensitive animals.

69-1198 CARCINOGENS FROM FUNGI PATHOGENIC FOR MAN. (E.) Blank, F. (Temple U. Health Sci. Ctr., Philadelphia, Pa.), O. Chin, G. Just, D. R. Meranze, M. B. Shimkin and R. Wieder. Cancer Res. 28(11):2276-2281, 1968.

Several extracts of pathogenic fungi were tested for carcinogenic activity in 2-mo.-old female CFW (Swiss Webster) mice (the extracts were inj. s.c.). Extracts of species of the genera Microsporum (3 species were tested), Trichophyton (6 species were tested), Epidermophyton floccosum, Scopulariopsis brevicaulis and Candida (2 species were tested) showed carcinogenic activity, as suggested by the appearance of s.c. sarcomas (5.4% of the 6-mo. survivors) and the increased frequencies of leukemia and lung tumors (the mammary tumor incidence was not significantly increased). The most active extract, the sodium carbonate wash of a methanol extract of Candida parapsilosis, contained no aflatoxin or polycyclic aromatic hydrocarbons. No s.c. sarcomas developed in mice inj. with 4 pure fungal metabolites or the vehicle (tricaprylin); 1/117 untreated controls (0.9%) developed 1 s.c. sarcoma.

69-1199 COCARCINOGENIC PRINCIPLES FROM THE SEED OIL OF Croton tiglium AND FROM OTHER EUPHORBIACEAE. (E.) Hecker, E. (German Cancer Res. Ctr., Heidelberg, Germany). Cancer Res. 28(11):2338-2348, 1968.

Methods for the separation of biologically active components from oils or latex preparations from plants of this widely distributed family are described, as is a computerized quantitative bioassay for tumor-promoting activity (skin tumors in 7,12-dimethylbenzanthracene-treated mice) and irritant activity (mouse ears). Most of the biological activity of croton oil (from the Southeast Asian shrub Croton tiglium) was found in the fraction containing phorbol-12,13-diesters. Seed oil from Euphorbia lathyris (an herb from Southern Russia, North America and the Mediterranean part of Europe) and latex from Euphorbia ingens (a tropical, cactus-like tree) contained the same biologically active component, which was structurally different from the active components of croton oil with respect to both the ester groups and the parent alcohol. All of the active components, however, showed a diterpene-type polyfunctional parent alcohol, esterified with 1 or 2 fatty acids. The biological activities of the active components were qualitatively and quantitatively similar.

69-1200 TUMOR-PROMOTING AGENTS FROM Croton tiglium L. AND THEIR MODE OF ACTION. (E.) Van Duuren, B. L. (New York U. Med. Ctr., N. Y.) and A. Sivak. Cancer Res. 28(11):2349-2356, 1968.

Several in vitro studies of the effects of phorbol ester C (a croton oil component promoting skin tumors in mice admin. 7,12-dimethylbenzanthracene [DMBA]) suggested that the tumor-promoting activities of this component were not greatly related to changes in lysosomal membrane stability, but that the cell membranes responded to the agent by a specific loss of permeability. Another study of the effects of croton oil fractions on mouse skin led to the conclusion that their irritant and tumor-promoting activities are probably not related to each other. A series of experiments in mice with croton resin-promoted skin tumors, treated with actinomycin D and other inhibitors at various times before or after tumor initiation by DMBA, suggested that the same inhibitors had different inhibitory effects at different time intervals. The use of tumor-promoting agents in the study of the relationships between initiating agents, mutagens and carcinogens is also discussed.

69-1201 MESOTHELIOMA AND ASBESTOS BODIES IN THE SPUTUM OF WORKERS IN A SHIPYARD. (Fr.) Planteydt, H. T. (Zeeland Reg. Lab., Middleburg, Netherlands). Poumon Coeur 24(5): 545-548, 1968.

Examination of 160 sputum specimens from employees of a shipyard in Flushing (which employs about 3500 persons) showed asbestos bodies in 97/160 (61%) specimens: 46/60 (77%) from shipbuilders, 31/56 (55%) from machine builders, 3/4 (75%) from persons in other production work, 15/17 (88%) from asbestos workers, and 2/23 (9%) from administrative and other personnel. During a 5-yr. period (unspecified), the author's laboratory (which serves an area of about 300,000 inhabitants, including the port of Flushing) identified 14 pleural and 5 peritoneal mesotheliomas: 17/19 in employees of this shipyard, 1 in a shipboard machinist and 1 in a foundry worker. None of these pts. had worked with asbestos and none showed asbestosis, but asbestos bodies (or particles resembling asbestos bodies) were found in 11/11 autopsy specimens of lung tissue. (See also the following abstract.)

69-1202 ASBESTOS BODIES AND MESOTHELIOMA. (E.) Stumphius, J. (Roy. "de Schelde" Ltd., Flushing, Netherlands) and P. B. Meyer. Ann. Occup. Hyg. 11(4):283-293, 1968.

Royal "de Schelde" Ltd., the only large industry in Flushing (with over 3100 workers at the end of 1967), is a shipyard (producing new ships) and machine tool manufacturing firm. Although it uses relatively little asbestos (for example, its employees have never installed asbestos insulation), 17/21 of the pleural and peritoneal mesotheliomas reported in Zeeland in 1964-1967 were seen in workers in this shipyard (the others were seen in 1 foundry worker, 1 pt. occupationally exposed to asbestos, 1 agricultural worker and 1 pt. of unknown occupation; none of whom had lived in the immediate neighborhood of the shipyard), and 2 other shipyard employees had probable mesothelioma. Asbestos bodies were found in 147/247 (53.5%) sputum specimens from shipyard employees, including 65/87 (75%) from shipbuilders and 22/24 (92%) from insulators. None of the shipyard workers with mesothelioma had asbestosis; all had been exposed heavily to iron oxides and only slightly to asbestos. Asbestos bodies from the lungs of these pts. (examined by electron diffraction, electron microscopy and X-ray microanalysis) showed cores of amphibole-type asbestos, with protein coatings containing a high percentage of iron. No "pseudo-asbestos bodies" were found. These data led to the suggestion that iron oxides may be cocarcinogenic with asbestos; animal experiments to test this hypothesis are recommended. (See also the preceding abstract.)

69-1203 ASBESTOS BODIES IN THE PLEURA OF PATIENTS DYING OF DIFFUSE PLEURAL MESOTHELIOMA. (Fr.) Basset, F. (Bichat Hosp., Paris). Poumon Coeur 24(5):537-542, 1968.

Examination of 2 asbestos-induced pleural mesotheliomas (by dark ground illumination after microincineration) showed bare asbestos fibers throughout the tumors, but asbestos bodies were very rare beyond the elastic lamina of the pleura. It is suggested that these very small foreign bodies migrate slowly through the lungs until they reach the mesothelial layer of the pleura or peritoneum, where they are captured by intracellular fixation (explained by the macrophage-like properties of the mesothelial cells). This mechanism might explain the formation of calcified pleural plaques in asbestosis. The presence of intracytoplasmic asbestos particles might result in metabolic disturbances (perhaps involving the lysosomes) which lead to malignant transformation of certain cell clones.

69-1204 ASBESTOS-INDUCED BRONCHIAL CANCER AND PLEURAL MESOTHELIOMA (2 NEW CASES). (Fr.) Turiaf, J., J. Chabot and F. Basset. Poumon Coeur 24(5):559-581, 1968.

Two men with bilateral anaplastic bronchial carcinoma (1/2) and pleural mesothelioma (1/2) following prolonged asbestos exposure are described. One pt. was a heavy smoker; the other smoked about 10 cigarettes/day. Both pts. had been exposed occupationally to asbestos for about 20 yr. (beginning 22-25 yr. before diagnosis), but in both cases the exposure was believed to have been light and intermittent. Both pts. showed a small amount of pulmonary fibrosis and asbestos bodies in the tumors; in the pt. with mesothelioma, asbestos fibers were found in the thickened area of the pleura and in the deep layer of the tumor.

69-1205 SPECIAL CHARACTERISTICS OF BRONCHIAL CANCER IN ASBESTOSIS. (3 NEW CASES). (Fr.) Dousset, G. (Calmette Hosp., Le Havre, France), J. Desbordes, J. Tayot, H. Duwoos, J. L. Ernoult, R. Manouvrier and J. Veret. Poumon Coeur 24(5):583-606, 1968.

One man and 2 women with occupational asbestosis and bronchial carcinoma (anaplastic small cell type in 1/3, mature epidermoid carcinoma in 1/3) are described. One woman had been exposed to asbestos for 13 yr., followed by 19 yr. at a different job without asbestos exposure, before diagnosis. In this pt., both the asbestosis and the bronchial cancer were clinically silent (except for terminal paraplegia caused by spinal metastases). The other 2 pts. had been exposed to asbestos for 22-26 yr.; 1/2 continued to work with asbestos for 11 yr. after the diagnosis of asbestosis, before a lung shadow suggesting bronchial carcinoma was noted. The man had smoked about 1 pack of cigarettes/day for 19 yr.; his wife also had asbestosis. Autopsy findings in all of these pts. are described in detail.

69-1206 ASBESTOS EXPOSURE AND PLEURAL MESOTHELIOMAS. (E.) Mortimer, R. H. (U. Queensland, Brisbane, Australia) and C. B. Campbell. Med. J. Aust. 2(17):720-722, 1968.

Two men with diffuse pleural mesotheliomas following "minor" asbestos exposure are described. One pt. had handled asbestos and asbestos cement routinely for 13 yr. before the development of symptoms. In the other pt., the latent period before the development of symptoms was 46 yr. (he had worked for 20 yr. in a shipyard, working with asbestos insulation for about 1 mo. each yr.). Both pts. were smokers. Interstitial fibrosis was minimal in both pts.; neither showed significant asbestosis. It is suggested that heavy asbestos exposure causes severe pulmonary fibrosis and pulmonary heart disease, and that such pts. do not live long enough to develop neoplasms, whereas persons exposed to relatively low amounts of asbestos develop insignificant respiratory insufficiency and survive long enough to develop mesothelioma.

69-1207 MORTALITY FROM LUNG CANCER AND OTHER CAUSES AMONG WORKERS IN AN ASBESTOS TEXTILE FACTORY. (E.) Knox, J. F., S. Holmes, R. Doll (U. Coll. Hosp. Med. Sch., London) and I. D. Hill. Brit. J. Industr. Med. 25(4): 293-303, 1968.

Causes of death in persons working in "scheduled" (high-exposure) areas of an asbestos (Asb) factory were studied over 50 yr. (1916-end of June, 1966). The commencing date for workers with mortality experiences related to improved working conditions was January 1, 1933, since the Asbestos Industry Regulations came into force during 1932. Mean annual Asb dust levels after 1960 were fairly constant (1-8 particles/ml air, varying from 1 place to another). Observed/expected (O/E) mortality (calculated from national av. rates) from all causes was markedly increased (48/17.07) in 57 men exposed for 20 yr. or more, including at least 10 yr. before 1933 (Group I), and significantly increased (23/16.18) in 63 men exposed for 20 yr. or more, including less than 10 yr. before 1933 (Group II). O/E mortality from lung and pleural cancer was significantly increased in Groups I and II (12/1.18 and 5/1.57, resp.). No increase in O/E mortality from other causes was seen in Group II. In Group I, O/E mortality from other cancer was not significantly increased (5/2.61, but 4/5 tumors were of the g.i. tract including the gallbladder), but O/E mortality from other respiratory diseases and from circulatory diseases was increased 14/2.37, and 13/5.33, resp.). Asbestosis was noted on the death certificates of 28/48 of Group I and 9/23 of Group II. In 538 men and 220 women exposed to Asb at least 10 yr., but not exposed before 1933, the mortality experience was close to the national av. values. Statistical analysis of the trends indicated a significant reduction of the occupational hazards of Asb exposure since 1932 (at least with respect to bronchial carcinoma); the results were in accordance with results based on the assumption that Asb exposure was responsible for a substantial proportion of deaths from lung cancer and from other diseases associated with asbestosis (but not deaths from other diseases without asbestosis). Of the 23 lung cancers in men exposed for at least 20 yr., 1 was regarded as a pleural mesothelioma and the others (about 18 in excess of expected) were bronchial carcinomas. Since 1963, 4 other mesotheliomas were identified, in 3 men and 1 woman exposed for less than 10 yr. (only 7 mo. in 1/4; 1 man had been exposed only since 1937).

69-1208 OCCUPATIONAL AND "NON-OCCUPATIONAL" ASBESTOSIS IN FINLAND. (E.) Noro, L. Med. Bull. Stand. Oil Co. 28(3):210-221, 1968.

The asbestos industry of Finland began in 1918 and medical surveys of asbestos workers were begun in 1946 (with regular X-ray examinations from 1954). Up to 1967, 144 cases of asbestosis were seen in Finnish asbestos workers (the industry employs about 500 workers); asbestosis was noted in 35 insulation workers (about 400-500 persons are so employed in Finland), but none showed mesothelioma. Over the last 30 yr., about 400 persons were exposed to asbestos dust for 1 yr. or more; 50% died of various causes and 90 persons (25%) showed asbestosis. Examination of 135 asbestos workers (including 24 retired workers) in 1967 showed asbestosis in 37/135, after exposure times of under 10 yr. (4/37), under 20 yr. (17/37) and over 30 yr. (2/37). None of these pts. had lung cancer or mesothelioma. Significant differences between these 37 pts. and the rest of the group included older ages, longer exposures, longer residence in the district, more pneumonia, phlegm production and pulmonary function disorders, and heavier smoking for longer periods of time. A review of studies of "non-occupational" asbestosis in Finland (18 references) indicated a higher incidence of asbestosis in urban areas than in rural areas, and a higher incidence in asbestos-producing areas than elsewhere, but the incidence of malignant lung, pleural and peritoneal tumors was not increased in high-asbestosis areas.

69-1209 THE NATURE OF TUMOR-PROMOTING AGENTS IN TOBACCO PRODUCTS. (E.) Bock, F. G. (Roswell Park Mem. Inst., Buffalo, N. Y.). Cancer Res. 28(11):2363-2368, 1968.

In a mouse skin bioassay (ICR Swiss mice admin. 1 dose of 7,12-dimethylbenzanthracene), organic and aqueous extracts (AE) of unburned cigarette tobacco showed tumor-promoting activity without significant complete carcinogenic effects at the low conc. tested. The AE (extracted by aqueous barium hydroxide) seemed to be more active than the organic extracts and were tested further. AE seemed to contain at least 2 agents (required simultaneously to show tumor-promoting activity): 1 soluble in 80% (and probably 95%) methanol, the other insoluble in 80% methanol and consisting either of a single compound of molecular wt. 1600, or of a spectrum of compounds (some of large molecular wt. and others with molecular wt. of 1600 or less). The high molecular wt. fraction was more active (calculated on a wt. basis). AE of commercial cigarettes were more active than AE from fresh tobacco leaf not sprayed with chemical agents. The source of this increased activity (curing and aging of the leaf, cigarette preparation, tobacco cultivation) was not determined. Other tumor-promoting agents were extracted from tobacco by nonpolar solvents. The relationships between the tumor-promoting effects of cigarette smoke condensate and the effects of AE of unburned tobacco were not determined, but no clear relationship was apparent.

69-1210 SPUTUM-CYTOLOGIC CHANGES IN SMOKERS AND NON-SMOKERS IN RELATION TO CHRONIC INFLAMMATORY LUNG DISEASES. (E.) Nasiell, M. (Karolinska Inst., Stockholm). Acta Path. Microbiol. Scand. 74(2):205-213, 1968.

Sputum cytology was studied in 398 smokers (over 9 cigarettes/day) and 50 non-smokers without lung diseases (Group A), 147 smokers and 123 non-smokers with chronic inflammatory lung diseases (tuberculosis, bronchitis, bronchiectasis; Group B) and 101 smokers with squamous cell or undifferentiated bronchogenic carcinoma (Group C; excluding a few non-smokers with bronchogenic carcinoma and 33 pts. with primary adenocarcinoma of the lung whose smoking habits were not always recorded). The increased frequencies of abnormal columnar cell findings (ACCF), metaplasia and atypical metaplasia (dysplasia) in both smokers of Group A and non-smokers of Group B, suggested that both chronic pulmonary inflammation and (particularly) smoking have a distinct injurious effect on the respiratory mucosa. The frequencies of atypical metaplasia caused by smoking alone and by chronic inflammation alone were high and equal; in smokers of Group B, the frequency of atypia was higher still, approx. the same as in Group C. Frequencies of ACCF, metaplasia and dysplasia were significantly higher in smokers than in non-smokers in both Groups A and B, and higher still in Group C.

69-1211 ENZYMATIC CHANGES IN FLUORESCENT ALVEOLAR MACROPHAGES OF THE LUNGS OF CIGARETTE SMOKERS. (E.) Roque, A. L. (Roswell Park Mem. Inst., Buffalo, N. Y.) and J. W. Pickren. Acta Cytol. (Balt.) 12(6):420-429, 1968.

Activities of dihydronicotinamide-adenine dinucleotide diaphorase (NADH diaphorase), lactate dehydrogenase, succinate dehydrogenase (SDH), cytochrome oxidase (CO), acid phosphatase and non-specific esterase were studied histochemically in alveolar macrophages in lung biopsy specimens from 17 chronic cigarette smokers with primary (11) or metastatic (4) lung cancer, a non-specific granulomatous inflammation (1) or mediastinal lymph node hyperplasia (1), and 4 non-smokers with metastatic lung tumors (3) or fibrous mesothelioma (1). Alveolar macrophages of the smokers showed a decrease in the activities of the hydrolases and oxidoreductases, directly proportional to the amount of fluorescent material (presumably originating from tobacco smoke) stored in the cells. SDH, CO and NADH diaphorase activities were markedly depressed in smokers. Since alveolar macrophages use energy mainly derived from oxidative metabolism, it is concluded that their phagocytic activity was impaired. It is suggested that the "ultrastructural and molecular lesions" induced by tobacco smoke occur in the mitochondrial "respiratory assemblies" where the oxidoreductases are localized.

69-1212 ELECTRON MICROSCOPIC OBSERVATIONS OF THE BRONCHIAL EPITHELIUM OF DOGS. I. CONTROL DOGS. (E.) Frasca, J. M. (Vet. Admin. Hosp., East Orange, N. J.), O. Auerbach, V. R. Parks and J. D. Jamieson. Exp. Molec. Path. 9(3):363-379, 1968.

The ultrastructure of the bronchial epithelium of 10 control dogs (beagles) is described in detail. Several differences from the ultrastructure of the rat and human tracheal epithelium were noted: large amounts of glycogen (seen occasionally in the basal cells, most frequently in the ciliated cells); fibrous aggregates resembling ciliary components in the basal region of the ciliated cells (often associated with structures resembling basal bodies); and 3 unusual cell types (2 variants of the migratory cell population, seen in large numbers after osmium and acrolein fixation; and a small number of "special type cells" in the epithelial layer, with a variable but usually large collection of specific membrane-bound granules).

69-1213 ELECTRON MICROSCOPIC OBSERVATIONS OF THE BRONCHIAL EPITHELIUM OF DOGS. II. SMOKING DOGS. (E.) Frasca, J. M. (Vet. Admin. Hosp., East Orange, N. J.), O. Auerbach, V. R. Parks and J. D. Jamieson. Exp. Molec. Path. 9(3):380-399, 1968.

Bronchial epithelial ultrastructure was studied in 6 dogs after various periods of cigarette smoke inhalation (5 dogs that died during the experiment were not examined). After 44 days of smoking (191 cigarettes; 1/6), goblet cells were more numerous and the surface lining cells showed fewer cilia. After 421-423 days of smoking (3702-4116 cigarettes; 5/6), both the goblet cells and the ciliated columnar cells had disappeared, the apparent number of epithelial cell layers had doubled, basal cells were frequently columnar-shaped and mitotic figures were common. Most cells showed many cytoplasmic filaments, which often seemed to displace cell organelles. The basement membranes were thickened, with an increase in fibrillar components and multiple layers of basement membrane material; many basal cells showed cytoplasmic projections, extending distally into the tunica propria through breaks in the basement membranes. The "special type cells" containing cell-specific granules were abundant (in controls they were rare); the 2 special migratory cell types (seen in osmium- and acrolein-fixed tissue) were rare, whereas these 2 cell types were abundant in controls (see the preceding abstract).

69-1214 CYTOLOGICAL ASPECTS OF LONG-TERM CIGARETTE SMOKING. (E.) Fullmer, C. D. (Holy Cross Hosp., Salt Lake City, Utah). Canad. J. Med. Techn. 30(6):249-253, 1968.

A classification system for pulmonary cytological changes induced by cigarette smoking is presented. In 11 older men with occult carcinoma (detected by pulmonary cytology) associated with long histories of heavy cigarette smoking and various complications (pulmonary emphysema; arteriosclerotic heart disease in some pts.), the survival rates nevertheless supported an opinion described as valid optimism. Diagnostic problems are discussed in relation to 3 case histories. Preliminary data obtained in a proposed 5-yr. study of 1000 or more men who had smoked heavily for over 20 yr. (less than 2% smoked under 1 pack/day) are presented. Only 2% showed negative cytology, 12% showed severe atypia and dyskaryosis, and 97% showed Curschmann's or other types of spirals of bronchial or bronchiolar origin. At the time of report, 1 carcinoma had been identified. However, in an unspecified number of men, severe epithelial abnormalities regressed to normal after the pts. stopped smoking. It is suggested that pulmonary cytology may be able to detect susceptible persons who can avoid surgery if they stop smoking.

69-1215 AN EFFECTIVE SYSTEM AND PROCEDURE FOR CIGARETTE SMOKING BY DOGS. (E.) Cahan, W. G. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.) and D. Kirman. J. Surg. Res. 8(12):567-575, 1968.

An apparatus and methods for reproducing many features of the human cigarette smoking pattern under controlled conditions are described. In the animals used (purebred male beagles, 1-2 yr. old), smoke from unfiltered or (later) low-nicotine filtered cigarettes was forced into the tracheobronchial tree through a tracheostomy; each dog smoked no more than 12 unfiltered cigarettes/day. All dogs showed an increased hematocrit during smoking. Five dogs died during the experiment; autopsy showed bronchopneumonia in 1/5 and thrombi of the right auricular appendage with pulmonary emboli in 4/5. The other 5/10 dogs survived the experiment and were sacrificed after 421-423 days; all animals showed pulmonary fibrosis and emphysema. No such pathological changes were seen in tracheostomized control dogs.

69-1216 VERRUCOUS SQUAMOUS CELL CARCINOMA OF THE ORAL CAVITY. (E.) Fonts, E. A. (U. Miami Sch. Med., Fla.), R. H. Greenlaw, B. F. Rush and S. Rovin. Cancer 23(1):152-160, 1969.

From 1961 through 1966, 160 pts. with head and neck tumors were seen at the University of Kentucky Medical Center (Tumor Clinic); 51 had tumors of the oral cavity and 10/51 had verrucous-type tumors (4 additional cases, not included in this group, were diagnosed by the dental school). The histological type was well-differentiated squamous cell carcinoma in 5/10 and typical verrucous carcinoma in 5/10. The av. age in these 10 pts. (5 men, 5 women) was 66.5 yr. (range 53-84); 9/10 were chronic tobacco chewers and 3/9 also used snuff. Other possibly contributory factors included poor oral hygiene; 5/10 wore poorly fitting dentures. All pts. were treated by radiotherapy and some also underwent surgery. In 3/10, the slowly-growing verrucous carcinomas underwent transformation to more anaplastic forms about 1-7 mo. after radiotherapy (which had caused excellent responses at first in 2/3). The marked mucositis usually present during treatment was attributed to the chronic mucosal changes seen in nearly all pts.; its relationship to the anaplastic transformation of some of the tumors (possibly induced by ionizing irradiation) could not be determined.

69-1217 HARMFULNESS OF CIGARETTE SMOKING. (Pol.) Chojnowski, J. R. (Second Clin. Intern. Dis., Lodz, Poland). Przegl. Lek. 24(6):527-531, 1968.

The toxicity of nicotine is reviewed, with special emphasis on its effect on the circulation. Electrocardiograms of 40 habitual smokers, performed before and after smoking 3 cigarettes (before breakfast), showed significant changes (lowering of the ST segment and flattening of the T wave) in 20 subjects; characteristic P wave changes were also frequent. Ophthalmoscopy showed constriction of the ocular arteries in 15/40. The presence of radioactive ^{14}C in tobacco smoke is discussed and the carcinogenic effects of the smoke (especially in the lungs), with the resulting increased mortality, are reviewed. Strict laws (including prohibition of smoking in enclosed places and smoking in persons under 18) and increased taxation of tobacco products are recommended.

69-1218 THE FIGHT AGAINST SMOKING IN CHILDREN. (E.) Pachman, D. J. (U. Illinois Coll. Med., Chicago). Illinois Med. J. 134(5): 625-631, 1968.

A survey (November, 1967) of school children in several counties of southern Illinois showed that 53% of the boys in Grades 4-6, 68-69% in Grades 9-11 and 77% in Grade 12 had tried cigarette smoking; 8% of the boys in Grades 4-6 were regular smokers, and this proportion increased steadily to over 40% in Grade 12. A survey (October-November, 1967) of 465 Chicago schools (222,560 pupils) showed a similar pattern. In Grade 6, 44% of the boys and 28% of the girls had tried smoking (7% and 2%, resp., were regular smokers); in Grade 10, 66% of the boys and 65% of the girls had tried smoking (32% and 28%, resp., were regular smokers). The proportion of smokers increased in all age groups, particularly after Grade 9; by Grade 12, 42% of the boys and 28% of the girls were smokers. Other studies showing that parental smoking habits strongly affect the children's smoking habits are presented. In a discussion of methods of anti-smoking education, it is suggested that such education should begin as early as kindergarten. Younger children may be greatly influenced by audiovisual materials; older children (particularly in Grade 8) respond better to a student-centered, peer-group approach.

69-1219 THE EFFECTS OF SOIL AND DIET ON DISEASE. (E.) Rose, E. F. (Bantu Cancer Reg., Butterworth, South Africa). Cancer Res. 28(11):2390-2392, 1968.

Possible reasons for the high but geographically varied incidence of esophageal cancer in the Transkei region are discussed: trace elements in the soil, dietary deficiencies (especially proteins), the uses of toxic plants as food and medicine (Senecio and cycads are mentioned), the widespread use of tobacco, and mycotoxins (throat swabs from cancer pts. and persons without cancer yielded hyphae and pods, but attempts to culture throat fungi were usually unsuccessful). One possible relationship is that between esophageal cancer and the levels of available silica in the soil; in 89% of the high-incidence areas, the soil was of a high-silica type, whereas 64% of the disease-free areas were on low-silica soil. Persons in the high-silica soil areas would be exposed to large quantities of silica, both from corn meal (ground by stones) and from silica phytoliths.

69-1220 CARCINOGENIC RESPONSE OF THE RESPIRATORY TRACT OF SYRIAN GOLDEN HAMSTERS TO DIFFERENT DOSES OF DIETHYLNITROSAMINE. (E.) Montesano, R. (U. Nebraska, Omaha) and U. Saffiotti. Cancer Res. 28(11):2197-2210, 1968.

In 142 adult male Syrian golden hamsters treated for 12 wk. with diethylnitrosamine (1 dose/wk. of 0.5-4.0 mg s.c.), a positive dose-response relationship was seen for tumor induction in the upper respiratory tract. Nasal cavity tumors (carcinomas, neuroepithelial tumors or squamous cell papillomas) developed early, with an incidence of 17-75% according to dosage. Laryngeal and tracheal tumors (incidences of 17-72% and 88-100%, resp.) were usually multiple polyps and papillomas. Tumors of the stem bronchi (histologically resembling the tracheal tumors) were rare; only 3 adenomatous lung tumors were seen in the entire group of 142 animals. A few peripheral proliferative lesions of the lung parenchyma were also noted at the highest dosages. The results demonstrated the distinct patterns of carcinogenic response to this agent in different areas of the hamster respiratory tract.

69-1221 STUDIES IN THE ETIOLOGY AND PREVENTION OF BLADDER CARCINOMA. (E.) Schlegel, J. U. (Tulane U. Sch. Med., New Orleans, La.), G. E. Pipkin, R. Nishimura and G. A. Duke. Trans. Amer. Ass. Genitourin. Surg. 60:14-21, 1968.

Combined excretion of 3-hydroxyanthranilic acid (HOA) and 3-hydroxykynurenine (HOK; tryptophan metabolites structurally resembling known bladder carcinogens) in the urine of pts. with bladder cancer (BC) was no greater than HOA + HOK excretion by normal smokers (NS) and normal non-smokers (NNS). Oxidation of added HOA to cinnabarinic acid (compound IV; which was not seen in the urine without added HOA) was significantly greater in urine from pts. with recurrent BC than in NNS; the HOA-compound IV reaction in NS was intermediate between BC and NNS values, and not significantly different from either group. Urinary ascorbic acid (AA) levels after AA admin. were lower in pts. with histories of BC (even in the absence of detectable BC) than in NNS. Urinary chemiluminescence (CL) after AA admin. (but not before AA admin.) was significantly greater in urine from BC pts. and NS than in urine of NNS, although pretreatment CL values were greatly reduced by AA in all cases. AA also completely blocked the oxidation of HOA to compound IV. Since urinary CL may be a mechanism revealing the carcinogenic potential of the urine, it is suggested that AA, by preventing the oxidation of HOA and similar aromatic amines to CL substances, might be used as a long-term treatment to prevent the recurrence of BC.

69-1222 THE INDUCTION OF NEOPLASMS OF THE URINARY BLADDER OF THE COW AND THE SMALL INTESTINE OF THE RAT BY FEEDING BRACKEN FERN (Pteris aquilina). (E.) Price, J. M. (U. Wisconsin Med. Sch., Madison) and A. M. Pamukcu. Cancer Res. 28(11):2247-2251, 1968.

Diets containing dried bracken fern (200-300 g/day; described as a suitable carcinogenic dose in animals weighing 100-150 kg) induced hematuria in 7/7 cattle (4 males, 3 females), after 60 days of feeding in 1/7 and after 335-545 days in 6/7. One animal died of other causes after 485 days, with microhematuria but no bladder tumors. The other 6/7 died after 510-1920 days of bracken fern feeding; 5/6 showed hemangiomas of the urinary bladder, together with transitional cell carcinomas (4/6) or papillomas (5/6) of the bladder. No gross tumors or urinary symptoms were noted in untreated controls. In 1 group of albino rats fed a diet containing bracken fern (33% by wt.), supplemented by thiamine, from age 49 days, 13/90 had died with multiple adenocarcinomas of the small intestine after 8 mo. of observation. Bladder tumors were also noted in 6/13. No gross tumors were seen in 2 other groups of animals fed bracken fern alone.

69-1223 PLANTS ASSOCIATED WITH ESOPHAGEAL CANCER CASES IN CURACAO. (E.) Morton, J. F. (U. Miami, Coral Gables, Fla.). Cancer Res. 28(11):2268-2271, 1968.

Autopsy records from 1936-1960 showed esophageal cancer as the most common tumor in men and women of the native population of Curacao (about 120,000 population; 75% locally born, of Negro descent); 115 cases were seen in 1960-1965, and the crude incidence rate remained the same throughout this period (20.9/100,000). From the early 1930's until 1964, fresh water was brought to Curacao in oil tankers and stored in empty oil tanks (most of the present drinking water supply is distilled sea water); the oily taste of the water contributed to the common consumption of plant teas to mask the objectionable flavor. On the nearby island of Aruba (with about half the population of Curacao and only 7 cases of esophageal cancer in 1963-1966), the use of plant teas (both medicinally and as beverages) is significantly less. A questionnaire concerning the use of these teas (44 Curacao pts. with esophageal cancer or their survivors were interviewed) showed marked differences between Curacao and Aruba. Of the 23 plants most commonly used in Curacao (6 traditionally admin. to infants and older children, 8 used by children and adults, 9 commonly used by adults), only 10 were similarly used in Aruba. The other 13 plants were unknown, rare, not used or taken differently (applied externally, not admin. to children, etc.) in Aruba. Samples of 50 plants were submitted for carcinogenic screening. It is also suggested that oil contamination of the drinking water before 1964 may have contributed to susceptibility to esophageal cancer.

69-1224 BIOLOGIC SCREENING OF SELECTED PLANT MATERIAL FOR CARCINOGENS. (E.) O'Gara, R. W. (NCI, Bethesda, Md.). Cancer Res. 28(11):2272-2275, 1968.

Esophageal cancer accounted for 92/531 cancers (17.3%) seen in 3487 autopsies performed in Curacao in 1936-1959 (by comparison, esophageal cancer accounted for 1.4% of all tumors seen in Negro pts. in Los Angeles). From 1960-1965, 115 new cases were seen in Curacao; the crude incidence rate in the Negro population of this island has remained constant over the last 30 yr. (about 18/100,000). Interviews of 40 pts. with esophageal cancer (or their survivors) resulted in a list of about 20 commonly used herbal teas; 14 of these were tested for carcinogenic activity (by admin. in the drinking water) in Swiss mice. The herbal teas designated as "Kalbas," "Mampuritu," "Flaira" (frequently admin. to children) and "Basora Pretu" showed some evidence of weak carcinogenic activity in mice; another preparation ("Krameria") induced a fibrosarcoma at the site of i.m. inj. in 1 rat. The possible relationship between the use of cathartics and colon cancer was studied in male mice. The only significant responses to nontoxic doses of these agents were forestomach tumors in 3/15 C57BL mice admin. calomel + $MgSO_4$, and an increased frequency of hepatoma, lymphoma and reticulum cell hyperplasia of the liver, spleen and lymph nodes in podophyllin-treated BALB/c mice. Further studies using higher doses or a different species of animal are recommended.

69-1225 COMPARATIVE ASPECTS OF AFLATOXIN-INDUCED HEPATIC TUMORS. (E.) Lancaster, M. C. (Nuffield Unit Lab. Animal

Path., Edinburgh). *Cancer Res.* 28(11):2288-2292, 1968.

Aflatoxin-induced liver tumors in rats, ferrets, ducks and trout are of a mixed type (derived from parenchymal cells and bile duct epithelium); 1 tumor in a sheep has also been described (a parenchymal cell carcinoma). Cattle, swine, turkey poults, chickens and guinea pigs are sensitive to the hepatotoxic effects of this compound, but no liver tumors have been described; mice are apparently resistant to both effects. Species differences in liver pathology after aflatoxin admin. are presented.

69-1226 DIETARY FACTORS AND HEPATOMA IN RAINBOW TROUT (*Salmo gairdneri*). II. COCARCINOGENESIS BY CYCLOPROPENOID FATTY ACIDS AND THE EFFECT OF GOSSYPOL AND ALTERED LIPIDS ON AFLATOXIN-INDUCED LIVER CANCER. (E.) Sinnhuber, R. O. (Oregon State U., Corvallis), D. J. Lee, J. H. Wales and J. L. Ayres. *J. Nat. Cancer Inst.* 41(6):1293-1301, 1968.

In trout fed a commercial ration containing aflatoxin B_1 (AB)-contaminated cottonseed meal (AB conc. of 0.042 ppm) for 2 wk., the hepatoma incidence after 9 mo. was 60%. In trout fed semipurified experimental diets containing 0.004-0.020 ppm of AB, a logarithmic dose-response relationship in the tumor incidence was seen. Addition of cyclopropenoid fatty acids (220 ppm) to the AB-containing diet (0.004 ppm of AB) markedly increased the incidence and growth of hepatoma; addition of gossypol (250 ppm) or 3-methylcoumarin (0.05 ppm) to AB-containing diets (0.004 ppm of AB) did not promote the early development of AB-induced tumors, but increased the incidence and size of the tumor nodules after 12 mo. Oxidized salmon oil and heat-polymerized corn oil did not enhance the carcinogenicity of AB.

69-1227 SYNERGISM BETWEEN CYCLOPROPENOID FATTY ACIDS AND CHEMICAL CARCINOGENS IN RAINBOW TROUT (*Salmo gairdneri*). (E.) Lee, D. J. (Oregon State U., Corvallis), J. H. Wales, J. L. Ayres and R. O. Sinnhuber. *Cancer Res.* 28(11):2312-2318, 1968.

In trout fed experimental diets containing aflatoxin B_1 (AB; usually 0.004 ppm), the combination of cyclopropenoid fatty acids (CPFA) from *Sterculia foetida* oil (56 and 112 ppm CPFA) and from *Hibiscus syriacus* oil (210 ppm CPFA) significantly enhanced the hepatocarcinogenic effects of AB. No hepatomas developed in trout fed 2-acetylaminofluorene (100 ppm) alone for 15 mo., but addition of *H. syriacus* oil to the diet resulted in a 20% incidence of liver tumors. The carcinogenic effects of AB were not affected by epoxyoleic acid (200 ppm; in *Veronia anthelmintica* oil), 5% sesame seed oil or 5% autoxidized salmon oil (peroxide value 200-300), but unusual lipid deposits were noted in the livers of fish admin. sesame seed oil.

69-1228 AFLATOXIN-PRODUCING POTENTIAL OF FUNGI ISOLATED FROM CURED AND AGED MEATS. (E.) Bullerman, L. B. (Iowa State U., Ames) and J. C. Ayres. *Appl. Microbiol.* 16(12):1945-1946, 1968.

Aflatoxins (identified by their thin-layer chromatographic properties and their toxic effects in chick embryos and ducklings, by comparison with standard aflatoxin preparations) were produced by 1 strain of *Aspergillus flavus* found on an Italian-type salami. Other samples of cured and aged meats (especially "country-cured" ham and "fermented" sausage) grew 59 other strains of *Aspergillus* (53 *A. ruber*, 2 *A. wentii*, 3 *A. niger*, 1 of the *flavus-oryzae* group) and 6 strains of *Penicillium* (3 *P. frequentans*, 1 *P. variable*, 2 *P. puberulum*). The 3 strains of *P. frequentans* and 42/59 strains of *Aspergillus* fluoresced in culture, but none of these fluorescing substances was identified as aflatoxin.

69-1229 TOXICITY TO EXPERIMENTAL ANIMALS OF 943 ISOLATES OF FUNGI. (E.) Christensen, C. M. (U. Minnesota Coll. Vet. Med., St. Paul), G. H. Nelson, C. J. Mirocha and F. Bates. *Cancer Res.* 28(11):2293-2295, 1968.

The toxicity of 943 fungal isolates (40 genera) from animal feeds (including a few human foods) and peanut products was studied in 14-day experiments, usually in 21-day-old weanling white rats, sometimes in chicks, ducklings or turkey poults. Nearly all of the feeds were suspected causes of illness or death in domestic animals. Of these isolates, 284/527 (54%) from feeds and 155/416 (37%) from peanut products were lethally toxic within 7 days. The majority of the isolates (628/943 = 67%) and 77% of the lethally toxic isolates (336/439) were of 4 genera: *Alternaria* (90% of the 60 isolates were lethal to rats), *Aspergillus*, *Fusarium* and *Penicillium*. The most frequent antemortem signs were leukopenia, hemoglobinuria, increased prothrombin type, bilateral squint and CNS disturbances. The most frequent autopsy signs were g.i. hemorrhage and hemoglobinuria. Severe bone marrow depression was also frequently seen.

69-1230 MYCOTOXINS IN FERMENTED FOOD. (E.) Kinosita, R. (City Hope Med. Ctr., Duarte, Calif.), T. Ishiko, S. Sugiyama, T. Seto, S. Igarasi and I. E. Goetz. *Cancer Res.* 28(11):2296-2311, 1968.

In 1968, cardiovascular diseases and cancer (especially stomach cancer and hepatoma) accounted for 39.3% and 16.7%, resp., of all deaths in Japan. Deaths from hepatoma decreased slightly from 1966 to 1968 in the rural areas, where environmental conditions (including diet) are changing. To study the role of fermented foodstuffs in cancer mortality, 24 commercial or home made specimens of fermented soybean paste (miso), dried bonito (katsuobushi) and dried rice "starter" (tane-koji), obtained in 3 districts of stable population composition, conservative modes of life and very high mortality from cardiovascular diseases, stomach cancer and hepatoma (the districts of Nara, Wakayama and Yamagata), were studied. Some specimens from Honolulu, Korea and Los Angeles were also studied. These food specimens yielded 37 strains of fungi (predominantly Aspergillus), 21 of which produced toxic substances, especially kojic acid and β-nitropropionic acid. Many of these strains were taxonomically closely related to aflatoxin-producing strains; none of these produced aflatoxin, but several yielded blue and green fluorescent metabolites. In short-term (up to 7 days) toxicity studies in male C3H/HeJ mice, the toxic substances caused a variety of pathological changes involving the liver, pancreas, stomach, myocardium and kidneys. The substances also showed significant biological activity in vitro (bacteriocidal effects, phage induction, cytotoxicity in hamster cell cultures).

69-1231 NICKEL CARBONYL INHIBITION OF RNA POLYMERASE ACTIVITY IN HEPATIC NUCLEI. (E.) Sunderman, F. W., Jr. (U. Connecticut, Hartford) and M. Esfahani. Cancer Res. 28(12): 2565-2567, 1968.

In male Sprague-Dawley rats (190-210 g) treated i.v. with nickel carbonyl at the LD_{50} level (equivalent to 2.2 mg Ni/100 g), DNA-dependent RNA polymerase activity in liver cell nuclei (measured 24 hr. later) was significantly inhibited (mean 1.07 U, compared to 2.67 U in liver nuclei of untreated controls). Phenobarbital-stimulated RNA polymerase activity (mean 3.48 U) was also inhibited by nickel carbonyl (mean 1.54 U). The relationship of this inhibition of RNA polymerase to nickel carbonyl carcinogenesis was not elucidated, but its potential significance was suggested by reports of a similar inhibition of RNA polymerase in liver nuclei after acute or chronic admin. of other carcinogens.

69-1232 ENHANCEMENT OF URETHAN INDUCTION OF HEPATOMAS IN MICE BY PRIOR PARTIAL HEPATECTOMY. (E.) Hollander, C. F. (Netherlands Cancer Inst., Amsterdam) and P. Bentvelzen. J. Nat. Cancer Inst. 41(6):1303-1306, 1968.

Urethan (U; 25 mg x 1 i.p.; aqueous soln.) was admin. to 3 groups of 2-mo.-old male C3H/HeA mice: 36 intact animals (Group I), 36 mice undergoing partial hepatectomy 7 days later (Group II), and 19 mice partially hepatectomized 4 days previously (Group III). The tumor incidence was studied 13 mo. later (age 15 mo.). The hepatoma incidence at this age in untreated controls was 4%. In Groups I, II and (particularly) III, the hepatoma incidence was significantly increased (31%, 50% and 84%, resp.), showing that the rapid liver proliferation after partial hepatectomy enhanced U hepatocarcinogenesis. In untreated controls, the lung tumor incidence at age 15 mo. was 6%; in the 3 U-treated groups it was 83%, 75% and 79%, resp., showing that hepatectomy did not affect pulmonary carcinogenesis by U. Leukemia developed in 1-3 mice of each U-treated group (in untreated mice, the spontaneous leukemia incidence was 19% at an av. age of 26 mo.); it could not be concluded from these data whether 1 inj. of U at this dose was leukemogenic in C3H/HeA male mice.

69-1233 THE INFLUENCE OF A LOW LIPOTROPE DIET ON RESPONSE OF MATERNAL AND FETAL RATS TO LASIOCARPINE. (E.) Newberne, P. M. (MIT, Cambridge, Mass.). Cancer Res. 28(11):2327-2337, 1968.

Several groups of Charles River (caesarean-derived) female rats were fed low-lipotrope diets (choline- and vitamin B_{12}-free) or control diets from day 1 of pregnancy, and treated with 1 or 2 p.o. doses of lasiocarpine (L) on day 13-17 of pregnancy. In 1 group (admin. 75 mg/kg of L on day 14), liver necrosis was seen in the offspring but not in the mothers; the offspring showed significant pathological changes in the liver at age 7 wk. In the other groups, liver necrosis was seen in both the mothers and the newborn offspring. The low-lipotrope diet enhanced the effects of L on both the maternal and the fetal liver.

69-1234 VARIATIONS IN THE CELL CYCLE DURING AZO DYE HEPATOCARCINOGENESIS. (E.) Simard, A. (Rockefeller U., New York, N. Y.), G. Cousineau and R. Daoust. J. Nat. Cancer Inst. 41(6):1257-1263, 1968.

Autoradiographic and cytophotometric studies of the livers of male Wistar rats fed 4-dimethylaminoazobenzene (0.06% in diet) suggested that malignant transformation of the liver parenchymal cells was associated with elimination or inhibition of both the G_1 and G_2 blocks of the mitotic cycle. Both of these changes contributed to the acceleration of cell growth at the sites of hepatoma formation.

69-1235 EFFECT OF GROWTH HORMONE ON HEPATIC CARCINOGENESIS AND CIRRHOSIS IN AxC RATS GIVEN N-2 FLUORENYLDIACETAMIDE. (E.) Reuber, M. D. (NCI, Bethesda, Md.). Cancer Res. 28(11):2177-2179, 1968.

In a 38-wk. experiment in inbred AxC mice fed N-2-fluorenyldiacetamide (0.025% in diet; 16 wk. of treatment in 4-wk. courses), treatment with porcine growth hormone (1 mg/100 g/day s.c.; 5 days/wk. for the first 19 wk., then 3 days/wk.) increased the incidence of hyperplastic liver lesions, hepatocellular carcinoma and cirrhosis in orchiectomized males and oophorectomized females, but did not affect liver carcinogenesis or cirrhosis induction in intact rats.

69-1236 HISTOCHEMICAL STUDIES OF GLUCOSE-6-PHOSPHATASE ACTIVITY IN PARENCHYMAL CELL DAMAGE ON THE LIVER OF RATS FED ON 4-DIMETHYLAMINOAZOBENZENE. (E.) Hadjiolov, D. (Bulgarian Oncol. Soc., Sofia). Neoplasma (Bratisl.) 15(4):399-403, 1968.

In male albino rats (about 150 g) fed 4-dimethylaminoazobenzene (DAB; 0.06% or 0.3% in a low-protein diet), glucose-6-phosphatase (G6P) activity in the liver parenchymal cells decreased progressively. After 60 days of DAB feeding, G6P activity reached zero in the central areas of the liver lobules. This decrease was dose-dependent, and independent of the proliferation of oval cells. These changes were considered nonspecific, indicating liver parenchymal damage, although the possibility of indirect effects on liver carcinogenesis were not excluded.

69-1237 ZONAL ELECTROPHORESIS OF THE SOLUBLE NUCLEAR PROTEINS OF NORMAL AND PRENEOPLASTIC LIVERS. (E.) Bakay, B. (U. Miami Sch. Med., Fla.) and S. Sorof. Cancer Res. 29(1): 22-27, 1969.

Saline-soluble nuclear proteins, found in the livers of adult male rats fed diets containing 3'-methyl-4-dimethylaminoazobenzene (for 20 days), were studied by column zonal electrophoresis. This procedure yielded 15 classes of soluble nuclear macromolecules: Classes 2-15 (strongly acidic, weakly acidic and near-neutral) were proteins, while Classes 16-18 (basic) were small molecules, apparently dissociated from macromolecules. About 50% of the protein-bound dyes were associated with a small class (Class 14) of near-neutral proteins; the rest were combined mainly with the acidic proteins of Classes 5-9. The saline-soluble nuclear proteins resembled the corresponding cytoplasmic proteins; the similarity applied particularly to the principal near-neutral nuclear azoproteins (Class 14) and the slow h_2 proteins of the cytoplasm.

69-1238 AZOPROTEINS OF LIVER NUCLEI ISOLATED IN AN AQUEOUS OR NONAQUEOUS MEDIUM FROM RATS FED AN AZOCARCINOGEN. (E.) Bakay, B. (U. Miami Sch. Med., Florida), S. Sorof and G. Siebert. Cancer Res. 29(1):28-32, 1969.

Liver cells were obtained from adult male rats fed diets containing 3'-methyl-4-dimethylaminoazobenzene (for 20 days). The nuclear proteins and azoproteins isolated in aqueous and nonaqueous medium contained similar quantities of saline-soluble and saline-insoluble protein-bound azo dyes. In the aqueous nuclear preparation, protein-bound dyes represented only 3% of those in liver; they were 86% saline-soluble, and their conc./mg protein was 43% of the cytoplasmic conc. Saline-soluble components represented 50% of the proteins of aqueous and nonaqueous nuclei; their electrophoretic patterns were similar. The aqueous nuclei contained large amounts of the specific soluble azoproteins (h_2-like azoproteins), but the levels of these slow azoproteins in the nonaqueous nuclei were low.

69-1239 THE INDUCTION OF LIVER CIRRHOSIS IN RATS BY PURIFIED AMINO ACID DIETS. (E.) Newberne, P. M. (MIT, Cambridge, Mass.), A. E. Rogers, C. Bailey and V. R. Young. Cancer Res. 29(1):230-235, 1969.

A method for inducing fatty nutritional cirrhosis (in weanling male Fisher rats) by lipotrope (choline, methionine, vitamin B_{12} and folic acid)-deficient diets containing purified amino acids (including L-amino acids) is described. The cirrhosis induced by these diets was identical to the characteristic lipotrope-deficiency cirrhosis induced by intact proteins, and showed a more consistent severity of the lesions and time of onset. The L-amino acid diets are recommended for studies of liver damage induced by liver carcinogens.

69-1240 ISOLATION AND DEGRADATION OF DNA FROM CELLS TREATED WITH TRITIUM-LABELED 7,12-DIMETHYLBENZ(a)ANTHRACENE: STUDIES ON THE NATURE OF THE BINDING OF THIS CARCINOGEN TO DNA. (E.) Brookes, P. (Roy. Cancer Hosp., London) and C. Heidelberger. Cancer Res. 29(1):157-165, 1969.

Binding of 7,12-dimethylbenzanthracene (DMBA) to nucleic acids and proteins from *E. coli* and *B. subtilis* was dose-dependent, but binding levels were low. DMBA binding to DNA, RNA and protein from mouse ascites tumor cells (Ehrlich ascites carcinoma) was time-dependent, but the level of binding was lower than the levels seen in mouse skin. Mouse embryo cells in culture were a good source of DNA bound to DMBA; levels of DMBA binding in cultures of mouse L cells or chicken fibroblasts were low. DNase degradation and fractionation of the DNA-DMBA complex suggested a binding of DMBA to the bases of DNA, resulting in partial inhibition of enzymatic degradation of the DNA. A similar partial inhibition was seen for DNA alkylated by 2-chloroethyl-2-hydroxyethyl sulfide (hemisulfur mustard), but not for DNA methylated by methyl methanesulfonate. The low levels of *in vivo* binding suggested the necessity for alternative methods of determining the nature of the bound hydrocarbon moiety and the base at which it is attached.

69-1241 ENZYME HISTOCHEMISTRY OF EXPERIMENTAL TUMORS OF THE CENTRAL NERVOUS SYSTEM. (Ger.) Osske, G. (Med. Acad., Erfurt, Germany), R. Warzok and W. Jänisch. Naturwissenschaften 55(10):495-496, 1968.

Two intramedullary and 5 intracranial tumors (3 sarcomas, 2 glioblastomas, 2 gliosarcomas) induced in rats by i.p. methylnitrosourea (MNU) were studied. Alkaline phosphatase activity (cell walls) was high in the very cellular portions of the brain tumors (especially in cells showing necrobiosis); the smaller intramedullary tumors showed some areas of activity. Acid phosphatase activity was weak to moderate in all tumors studied; some foci of higher activity were noted, especially in 1 gliosarcoma showing regressive changes. $NADH_2$-tetrazolium reductase activity was moderate in all tumors studied (levels in the reactive astrocytes were low); higher activity was seen in the regressing gliosarcoma. Lactate dehydrogenase activity was low in all tumors studied; succinate dehydrogenase activity was low in 3 tumors and absent in the other tumors studied. Cytochrome oxidase activity was low, especially in the regressing gliosarcoma. Arylesterase activity was low in the 4 tumors studied. Leucine aminopeptidase was absent in all tumors studied. This enzymatic profile resembled that seen in tumors induced by i.v. MNU.

69-1242 EXPERIMENTAL TUMORS OF THE CENTRAL NERVOUS SYSTEM. (Ger.) Schreiber, D. (Med. Acad., Erfurt, Germany), W. Jänisch, P. Scholtze and H. Tausch. Naturwissenschaften 55(10):495, 1968.

CNS carcinogenesis by an acidic soln. of methylnitrosourea (MNU; pH 4.3-4.4) was studied in 2 groups of hooded rats: 34 newborn to 1-wk.-old animals (Group I) and 29 young or adult animals (60-360 g; Group II). Doses of MNU (i.p.) were 20 mg every 4 wk. (max. of 9 doses) in Group I, and 10 mg every 2 wk. (max. of 18 doses) in Group II. Only 3/63 animals (both groups) failed to develop tumors. CNS tumors developed in 21/34 of Group I and 21/29 of Group II; the 51 CNS tumors (as of day 97 of the experiment) included 30 cerebral and 12 intramedullary cortical tumors (12 sarcomas, 7 gliosarcomas, 9 oligodendrogliomas, 6 glioblastomas, 1 astrocytoma, 7 unclassified tumors) and 9 tumors of the cranial or spinal nerves. The av. latent period was shorter in the newborn rats (196 days) than in the older group (av. 284 days), but the course of tumor development was similar in both groups. Malignant extraneural tumors developed in 23/34 of Group I and 17/29 of Group II (including 22/42 with CNS tumors). These included 36 sarcomas (17 peritoneum or peritoneal cavity, 4 each kidney, uterus and mediastinum, 7 of other sites), 15 carcinomas (6/15 of the forestomach) and 27 papillomas of the forestomach. Comparison of these results with the largely negative results seen in a previously published study of rats admin. MNU (1 dose/wk. of 10 mg/kg i.p.) in a pH 7.0 soln. (only 6/20 developed abdominal neurinomas) led to the suggestion that CNS carcinogenesis after i.p. admin. MNU may depend on the pH of the soln.

69-1243 EXPERIMENTAL CENTRAL NERVOUS SYSTEM TUMORS IN RABBITS. (Rus.) Jänisch, W. A. (Acad. Med. Sci., Erfurt, Germany), D. Schreiber and R. Warzok. Vop. Onkol. 14(12): 76-80, 1968.

Methylnitrosourea (MNU; 2 inj./mo. of 10 mg/kg i.v.) was admin. throughout life to 32 rabbits (1.2-3.1 kg at the beginning of treatment); 5/32 died of side effects and the other 27/32 were evaluable. Tumors of the brain or (in 3 animals) brain and spinal cord developed in 18/27 evaluable animals after 235-339 days of MNU treatment (total dose 372-804 mg; av. dose 558 mg over 281 days); these CNS tumors were identified as glioblastoma multiforme in 13/18, sarcoma in 4/18 and astrocytoma in 1/18. Tumors of other organs developed in 5/18 with and 4/9 without CNS tumors; these 9 animals showed 6 carcinomas, of the small and large intestine (4 and 1 tumors, resp.) or ear (1; at the site of i.v. MNU inj.) and 9 hemangioendotheliomas, of the lung (3), uterus (3), kidney (2) or liver (1). No tumors developed in 5/27 rabbits.

69-1244 ANTIGENS COMMON TO RAT HEPATOMAS INDUCED WITH 2-ACETYLAMINOFLUORENE. (E.) Isojima, S. (Roswell Park Mem. Inst., Buffalo, N. Y.), Y. Yagi and D. Pressman. Cancer Res. 29(1):140-144, 1969.

Autochthonous hepatomas induced in male Fisher rats by 2-acetylaminofluorene feeding showed several antigenic components in common, which were not found in normal rat liver (although the hepatomas contained antigenic components present in normal liver). Cultured cells from the hepatomas also showed these hepatoma antigens. Rabbit antisera prepared against microsomes from 6 hepatoma nodules (2 nodules from each of 3 rats) gave positive results (by the indirect fluorescent antibody method) with essentially all of the hepatoma nodules, even after exhaustive absorption with normal rat liver. Rabbit antisera against normal rat liver did not react with the hepatoma nodules after similar treatment.

69-1245 INFRARED SPECTRA OF PHOTODIMERS OF ANTHRACENE, BENZO(a)ANTHRACENE, AND TETRACENE. (E.) Singh, S. (U. Montreal, Canada) and C. Sandorfy. Canad. J. Chem. 47(2):257-263, 1969.

69-1246 CIGARETTE SMOKING AND HEALTH. (E.) Editorial. Southern Med. J. 62(2): 236-237, 1969.

See also abstract nos.: 1127,1130,1131,1132,1133,1134,1135,1136,1138,1139,1140,1141,1142,1143,1144, 1145,1146,1147,1148,1149,1150,1153,1159,1160,1161,1162,1169,1176,1343

69-1247 INFECTION OF HAMSTER SPLEEN AND THYMUS WITH HERPES SIMPLEX VIRUS IN VITRO AND IN VIVO. (E.) Muñoz, N. (NCI, Bethesda, Md.), A. Rabson, V. Bedoya and S. Tyrrell. J. Nat. Cancer Inst. 42(1):165-174, 1969.

In organ cultures of hamster spleen and thymus, herpes simplex virus (HSV) proliferated and induced necrotizing lesions and intranuclear inclusion bodies. Similar lesions were produced in vivo after intrathymic or intrasplenic inoc. of HSV; i.p. inoc. HSV produced lesions in the liver, but not the spleen or thymus. The possibility of a "blood-thymus barrier" for HSV is suggested. No signs of proliferation of the lymphoreticular cells, thymic epithelium or thymocytes were seen in HSV-induced lesions.

69-1248 INHIBITION OF ADENOVIRUS 12 ONCOGENICITY BY ADENO-ASSOCIATED VIRUS. (E.) Kirschstein, R. L. (NIH, Bethesda, Md.), K. O. Smith and E. A. Peters. Proc. Soc. Exp. Biol. Med. 128(3):670-673, 1968.

In newborn Syrian hamsters inoc. s.c. with adenovirus 12 (Ad-12) or Ad-12 + adeno-associated virus type 1 (AAV), the tumor incidence was 26/43 (60.5%) and 12/58 (19.0%), resp.; tumors appeared earlier with Ad-12 alone than with Ad-12 + AAV group (33-81 and 47-115 days, resp.). All tumors were undifferentiated sarcomas. Addition of heated Ad-12 to unheated Ad-12 did not affect the tumor incidence.

69-1249 HEMAGGLUTININ OF ADENOVIRUS 31. (Fr.) Henry, M. (Fac. Med., Lyon, France), R. Sohier and M.-F. Armynot Du Chatelet. C.R. Acad. Sci. [D] (Paris) 267(22):1903-1904, 1968.

The properties of a hemagglutinin from oncogenic adenovirus 31 resembled those of other adenovirus hemagglutinins. A specific homologous antiserum inhibited this hemagglutinin, but antisera to adenoviruses types 3 (subgroup I), 13 (subgroup II), 1 (subgroup III) or 18 (subgroup IV) had no inhibitory effect.

69-1250 INHIBITORY ACTION OF CRUDE INTERFERON ON LYMPHATIC LEUKEMIA IN AKR MICE. (Fr.) Gresser, I. (Sci. Res. Inst. Cancer, Villejuif/Seine, France), J. Coppey and C. Bourali. C.R. Acad. Sci. [D] (Paris) 267(2): 1900-1902, 1968.

Prolonged treatment with a crude interferon preparation (obtained from the brains of mice infected with West Nile virus) significantly increased the mean survival time in male AKR mice, and reduced the incidence of macroscopic signs of leukemia (at death) from 93% (controls) to 52%. No significant reduction in spontaneous leukemia development was noted in interferon-treated females. Admin. of a preparation from normal mouse brain did not affect leukemia development. In newborn AKR mice inoc. with a lymph node and thymus cell suspension from a leukemic AKR mouse, treatment with interferon significantly increased the mean survival times in females and in orchiectomized males, but nearly all mice had leukemia at the time of death.

69-1251 TRANSMISSION OF MOUSE LEUKEMIA BY ORAL ROUTE. (E.) Gross, L. (VA Hosp., Bronx, N. Y.). Acta Haemat. (Basel) 40(1-2): 1-8, 1968.

Leukemia developed in 12/12 C3H(f) female mice (3-4 wk. old), 3-11 mo. after voluntary ingestion of a single meal of fresh passage A virus-induced leukemic cell suspension (mixed with milk and bread). Lymphosarcomas (involving predominantly the thymus, liver, spleen and peripheral lymph nodes) were also observed in 12/12 mice. In 14 mo. of observation, no leukemia was seen in 8 littermates that voluntarily ingested a single meal of heated (56° C for 30 min.) leukemic cell suspension (mixed with milk and bread). The spontaneous leukemia incidence in this strain never exceeded 0.5-1.0% over 10 yr. of observation.

69-1252 QUANTITATIVE DISTRIBUTION OF VIRIONS IN VIRUS-INDUCED MURINE LEUKEMIA. (E.) Rich, M. A. (Einstein Med. Ctr., Philadelphia, Pa.) and L. W. Johns. J. Nat. Cancer Inst. 41(6):1463-1475, 1968.

The thymuses of random-bred ICR/Ha Swiss mice inoc. with Rich mouse leukemia virus (100 LD_{50} units) were examined 1-4 days after infection. Control (no virus) mice were similarly examined. Large numbers of characteristic leukemia-like virions with similar localization and distribution were seen in both groups. At 70 days, the thymuses of leukemic mice showed an increased number of virions in the intercellular spaces. The number of virions proliferating and accumulating within the vacuoles of epithelial cells and lymphocytes was not significantly higher in infected mice than in normal controls. The larger number of virions seen in the thymuses of newborn control mice diminished in adult mice. It is suggested that the proliferation and accumulation of leukemia-like virions in the thymuses of newborn mice are not causally related to the subsequent proliferation of infectious virus and the development of leukemia.

69-1253 BIOCHEMISTRY OF FRIEND VIRUS-INFECTED CELLS. I. VIRION-SPECIFIC RNA. (E.) Franker, C. K. (U. California, Los Angeles) and P. A. Riebeck. Biochem. Biophys. Res. Commun. 33(1):80-87, 1968.

Sucrose density gradient profiles of purified, ^{32}P-labeled Friend leukemia virus (FLV) RNA showed 2 distinct sedimentation peaks, 1 below 10S and another at about 68S, with different base compositions (the adenine and uracil contents of the 68S fraction were higher than those of the below-10S fraction). Sedimentation profiles of ribosomal RNA from FLV-infected mouse spleen cells showed distinct peaks at 28S and 18S, again with different base compositions (the adenine and uracil contents were higher in the 18S peak than in the 28S peak). This incongruity between values obtained for the cellular species and both viral fractions suggested non-homology; the results also suggested that the primary structure of either FLV fraction was in accord with a model for single-stranded RNA. The disparity in base composition between the 2 viral fractions suggested either degradation of a single moiety with "region-specific" sequences, or independent origins for each RNA component.

69-1254 VIRUS-INDUCED POLYCYTHEMIA IN MICE: ERYTHROPOIESIS WITHOUT ERYTHROPOIETIN. (E.) Mirand, E. A. (Roswell Park Mem. Inst., Buffalo, N. Y.), R. A. Steeves, R. D. Lange and J. T. Grace, Jr. *Proc. Soc. Exp. Biol. Med.* 128(3):844-849, 1968.

Ha/ICR Swiss mice (both sexes; 4-12 wk.) infected with a polycythemia-inducing strain of Friend virus (FV-P) had no measurable erythropoietin (ESF) activity in the plasma or urine 28-48 days after infection. Plasma obtained from mice 8-31 hr. after FV-P infection failed to stimulate 24-hr. blood ^{59}Fe uptake in plethorized recipients. Levels of renal erythropoietic factor were not increased; multiple inj. of anti-ESF did not inhibit the reinitiation of erythropoiesis in plethorized, FV-P-infected mice, or the formation of macroscopic spleen foci in nonplethorized, FV-P-infected mice. It is suggested that FV-P-induced polycythemia is an example of ESF-independent erythropoiesis.

69-1255 EFFECT OF A LEUKEMIA VIRUS ON ERYTHROPOIESIS. (E.) Brodsky, I. (Hahnemann Med. Coll. Hosp., Philadelphia, Pa.) and S. B. Kahn. *J. Nat. Cancer Inst.* 42(1):39-49, 1969.

Erythropoiesis was studied in weanling female BALB/c mice in the preleukemic phase of Rauscher leukemia virus (RLV) infection. The anemia initially induced by RLV resulted from a combination of relative bone marrow failure (which subsided after 3-6 wk.) and hemolysis (which persisted throughout the 24-wk. experiment); both of these symptoms were potentiated by splenectomy. The shortened RBC survival time (the index of hemolysis) probably resulted from a direct effect of RLV on the RBC membrane. This altered erythropoiesis was a non-neoplastic manifestation of RLV infection.

69-1256 THE EFFECT OF A LEUKEMIA VIRUS ON THROMBOPOIESIS. (E.) Brodsky, I. (Hahnemann Med. Coll. Hosp., Philadelphia, Pa.), E. M. Ross, S. B. Kahn and G. Petkov. *Cancer Res.* 28(12):2406-2412, 1968.

Weanling female BALB/c mice, inoc. i.v. with Rauscher leukemia virus (RLV), developed a virus titer-dependent thrombocytopenia which was potentiated by splenectomy. The platelet count rose 4-6 wk. after infection, then reached a plateau, and again fell when the mice were dying. The degree of recovery in platelet count was greater, and the severity of the secondary thrombocytopenia was less, with the lower RLV doses. At 2 wk., the bone marrow was hypercellular with megakaryocytic hyperplasia, but at 10-24 wk. the marrow was infiltrated with leukemic cells and megakaryocytes were absent. Platelet survival was decreased 4 and 7 days after infection. It is suggested that the early, reversible thrombocytopenia was a preleukemic manifestation, resulting from a direct action of RLV on the megakaryocytes, whereas the late thrombocytopenia was secondary to bone marrow infiltration with leukemic cells.

69-1257 STRUCTURE OF RAUSCHER MOUSE LEUKAEMIA VIRUS RNA. (E.) Blair, C. D. (U. California, Berkeley) and P. H. Duesberg. *Nature (London)* 220(5165):396-399, 1968.

The structures of several viral RNA's were studied by density gradient sedimentation and electrophoresis. The 63S sedimentation peak of Rauscher mouse leukemia virus RNA was disaggregated into a 37S peak under the same conditions (addition of dimethylsulfoxide, or heating to 40-52° C in 0.01 M NaCl) that caused disaggregation of Rous sarcoma virus RNA, but did not affect the sedimentation profiles of RNA's from Newcastle disease or tobacco mosaic viruses. Further studies of the 2 tumor viruses suggested that the major peaks of both RNA's consist of aggregates of smaller molecules, held together by weak physical bonds. It is suggested that an aggregate may be a structure common to the viral RNA's of the avian leukosis-sarcoma and mouse leukosis-sarcoma groups.

69-1258 DIVERGENCE IN TUMOR INDUCTION OF THYMUS CELLS TRANSFORMED *IN VITRO* BY GROSS LEUKEMIA VIRUS. (E.) Ioachim, H. L. (Coll. Phys. Surg. Columbia U., New York, N. Y.). *J. Nat. Cancer Inst.* 42(1):101-113, 1969.

Two morphologically identical tissue culture lines (designated A and G) were derived from W/Fu rat embryonic thymus cultures infected *in vitro* with Gross mouse leukemia virus (GLV). After up to 38 mo. of continuous *in vitro* growth, both cultures showed abundant GLV replication (as demonstrated by electron microscopic examination and mouse bioassays) and the characteristic growth patterns and morphology of neoplastic transformation. Transplantation studies in immunologically deficient W/Fu rats (newborns or preconditioned adults) showed different tumor-inducing properties for these 2 cell lines. The G cells had neoplastic properties, inducing tumors (identified as reticulum cell sarcomas, histiocytic type) at the inj. site in 100% of the recipients. Rats inoc. with A cells by any route developed only thymomas of the typical GLV type, however, indicating that the A cells themselves were nonmalignant. It is suggested that most of the present criteria used to assess neoplastic transformation in vitro may have to be reinterpreted, since continuous established cell lines, with high growth rates and lack of contact inhibition, may not necessarily have acquired neoplastic properties.

69-1259 THE ZONAL CENTRIFUGE APPLIED TO THE PURIFICATION OF A LOW-YIELD VIRUS IN HUMAN LEUKEMIA CELLS. (E.) Toplin, I. (Chas. Pfizer & Co., Inc., Maywood, N. J.), R. Boyden, A. De Padova, P. Brandt and P. Sottong. Biotech. Bioengineer. 10(5):651-668, 1968.

Methods of isolation of the herpes-type virus found in some cultures of the Burkitt lymphoma (as well as cell cultures of other human leukemias and normal human WBC) are described. The model used was the Jiyoye (P3) Burkitt lymphoma cell line. The highest purified virus yield was seen after zonal centrifugation of conc. cell-free spent media from highly infected cell cultures. Viral preparations containing 10^{10}-10^{11} virus particles/ml and total protein conc. of 0.2-0.5 mg/ml were obtained. The buoyant virus density was 1.18-1.27 in potassium tartrate; this heterogeneity was attributed to the different forms of the virus observed under the electron microscope (nucleated particles were generally seen in the zones of higher density, while enveloped particles without nucleoids were seen in the lighter density zones).

69-1260 STUDIES ON CHROMOSOMES OF THREE HUMAN CELL LINES HARBORING THE EB VIRUS PARTICLES. (E.) Kurita, Y. (Aichi Cancer Ctr., Nagoya, Japan), T. Osato and Y. Ito. J. Nat. Cancer Inst. 41(6):1355-1366, 1968.

Three human cell lines known to harbor the EB virus were studied: THE-2 (pseudodiploid, female) and THE-3 (hyperdiploid, male), derived from human embryo cells exposed to culture fluids from human leukemic cells (acute myelocytic leukemia) in vitro, and P3 (Jiyoye) and its subline P3HR-1 (hyperdiploid, male), derived from the Burkitt lymphoma. Chromosome anomalies seen in 4/4 cell lines were an extra chromosome in Group 6-12 + X (probably a #10 chromosome) and a prominent subterminal secondary constriction in the #10 chromosome. A metacentric marker chromosome of the size of #10 (morphologically identical to that reported in some Burkitt lymphoma cell lines) was consistently present in the THE-3, P3 and P3HR-1 cell lines. It is suggested that the #10 chromosome lesion may be related to the production of the EB virus.

69-1261 PRELIMINARY NOTE: IDENTITY OF A HERPESVIRUS ANTIGEN FROM BURKITT LYMPHOMA OF MAN AND LUCKÉ ADENOCARCINOMA OF FROGS. (E.) Fink, M. A. (NIH, Bethesda, Md.) G. S. King and M. Mizell. J. Nat. Cancer Inst. 41(6): 1477-1478, 1968.

Herpesviruses isolated from a Burkitt lymphoma cell line (P3) and from the Lucké frog adenocarcinoma showed at least 1 antigen in common, as demonstrated by immunodiffusion tests using both viruses as antigens and sera from Burkitt lymphoma pts. and Vermont field frogs (Rana pipiens pipiens) as antibodies.

69-1262 A SEARCH FOR AVIAN LEUKOSIS VIRUS AND ANTIVIRAL ACTIVITY IN THE BLOOD OF LEUKEMIC AND NONLEUKEMIC ADULTS AND CHILDREN. (E.) Solomon, J. J. (U.S. Dept. Agric., East Lansing, Mich.), H. G. Purchase and B. R. Burmester. J. Nat. Cancer Inst. 42(1):29-33, 1969.

Several experiments were performed to determine the presence of avian leukosis virus and antibodies to Rous sarcoma virus (RSV) in serum and plasma specimens from normal subjects and children or adults with leukemia. Nonspecific factors in some human blood samples gave spurious results in chick embryo tissue culture, but not on the chick embryo chorioallantoic membrane, indicating that the presence of anti-RSV activity in some leukemic or nonleukemic human sera was neither specific nor associated with leukemia. No evidence of avian leukosis virus was found.

69-1263 MULTIPLICATION OF AVIAN LEUKOSIS VIRUS IN ENDOCRINE ORGANS OF CONGENITALLY INFECTED CHICKENS. (E.) Di Stefano, H. S. (Upstate Med. Ctr., Syracuse, N. Y.) and R. M. Dougherty. J. Nat. Cancer Inst. 42(1):147-154, 1969.

Endocrine organs (excluding the gonads) from 21-wk.-old White Leghorns, from a flock congenitally infected with Strain F-42 of avian leukosis virus (ALV), were examined under the electron microscope. ALV buds were found on acidophils and basophils of the anterior pituitary, epithelial cells of the thyroid follicle, and cells of the adrenal cortex and parathyroid; the large numbers of free viral particles indicated very active ALV multiplication in these organs. No ALV buds were seen in association with the hormone-producing cells of the adrenal medulla. The infected birds appeared clinically healthy and were indistinguishable from uninfected birds of comparable age and physiological status; no signs of hormonal disturbance were noted.

69-1264 FIBROBLASTOID TRANSFORMATION OF MALIGNANT MYELOBLASTS IN VITRO. (E.) Bubeník, J. (Inst. Exp. Biol. Genet., Czech. Acad. Sci., Prague), L. Donner, P. Chýle, P. Koldovský, V. Malasková, J. Libánský, L. Vepřek and J. Riman. Folia Biol. (Praha) 14(5): 359-371, 1968.

Strain BAI-A of avian myeloblastosis virus was admin. to 1-2-day-old chicks; after the development of leukemia, leukemic myeloblasts (LM) from these birds were seeded on primary cultures of chick embryo fibroblasts (CEF). After varying times of cocultivation on either irradiated (12,000 r) or nonirradiated CEF, the LM were transformed into fibroblast-like cells. Studies of LM of male karyotype seeded on irradiated CEF of female karyotype demonstrated that the transformed cells arose only from the LM, not from the irradiated CEF (the CEF eventually disappeared from the cultures). Activities of lactate dehydrogenase and adenosine triphosphatase were high in both the LM and the transformed cells, but almost absent in the CEF.

69-1265 ELECTRON MICROSCOPY OF THE IRISES OF CHICKENS WITH SPONTANEOUS OCULAR LEUKOSIS. (E.) Simpson, C. F. (U. Florida, Gainesville). Cancer Res. 29(1):33-39, 1969.

The irises of 7 chickens with spontaneous ocular leukosis ("gray eye") showed necrotic striated musculature, mononuclear cells and granulocytes. Under the electron microscope, virus particles were seen embedded in the basement membrane of the striated muscle cells, in membrane-bound vesicles in the muscle cells, near the pigmented epithelial cells, and in the lumen and basement membranes of the endothelial cells of the iris capillaries. Necrosis of the striated muscle cells was associated with large intra- and extracellular masses of virus particles.

69-1266 VIRAL RESEARCH ON BOVINE LEUKOSIS. (E.) Dutcher, R. M. (Inst. Med. Res., Camden, N. J.). Bibl. Haemat. 30:116-135, 1968.

Attempts to transmit bovine leukosis (BL) directly to cattle, and otherwise to recover a specific causative agent, were unsuccessful, although bovine lymphosarcoma cells were successfully transplanted into irradiated newborn calves. Further studies of resistance in vitro to vesicular stomatitis virus demonstrated no significant correlation to clinical cases of BL. Some of these resistant cultures, as well as tissue biopsies, cell cultures and milk from both leukemic and clinically normal cattle, showed virus-like particles (VLP) resembling Type C mouse leukemia virus, but these VLP were few in number and no well-defined budding VLP were noted. Milk proved to be the best source of these VLP. Results of characterization studies of VLP from milk showed close parallels with the known morphological and biophysical characteristics of mouse leukemia virus, although these VLP have not been established as the causative agent of BL (or even as a virus).

69-1267 ISOLATION OF A LEUKOSOGENIC AGENT FROM TISSUE OF A LEUKEMIC COW. (E.) Bergolz, V. M. (Oncol. Inst., Moscow) and V. V. Dementieva. Bibl. Haemat. 30:154-156, 1968.

After 12 days of incubation, culture fluid from a surviving primary lymph node culture, obtained from a cow with reticulosis, was added to human embryonic kidney (HEK) monolayers, followed by 5 passages over 89 days in HEK cells. Infected cells showed both a CPE and virus-like particles, whereas uninfected cultures did not. In mice of the low-leukemia CC57br strain, i.p. inoc. of culture fluid from passage 4 of this agent induced leukemia in 50% of the 15-day survivors (a transplantable leukemia, passaged by cells or cell-free preparations, was obtained from 3 of the leukemic mice). Passage 5 of this agent was less leukemogenic after intrasplenic inoc. No leukemia developed in mice inoc. i.p. with culture fluid from uninfected control cells.

69-1268 BEHAVIOUR OF MACRONUCLEOLAR AND POLYNUCLEOLAR LYMPHOCYTES IN CATTLE WITH LEUKOSIS AND LYMPHOCYTOSIS. (E.) Urbaneck, D. (Ger. Acad. Agric. Sci., Berlin) and W. Wittmann. Bibl. Haemat. 30:197-199, 1968.

Polynucleolar lymphocytes (pL) were significantly increased, and the percentage of macronucleolar lymphocytes (mL) was significantly decreased, in peripheral blood conc. from cattle with leukosis, preleukosis or temporary lymphocytosis, by comparison with healthy cattle. The pL count showed a low standard deviation; the significantly decreased percentages of non-classifiable lymphocytes indicated more prominent nucleoli in bovine leukosis than in normal animals. These experiments revealed that continuous lymphocytosis in cattle is connected with the release of a large number of pL, and is probably connected with proliferation in the lymphoid tissue pulp where the pL are formed. No significant differences were seen in pL and mL levels between cattle with leukosis, preleukosis and temporary lymphocytosis.

69-1269 ELECTRON MICROSCOPIC STUDIES OF PERIPHERAL BLOOD LEUKOCYTES IN CATTLE. (E.) Weber, A. F. (Coll. Vet. Med., U. Minnesota, St. Paul), J. L. Andrews, B. M. Dickinson and S. P. Frommes. Bibl. Haemat. 30:203-205, 1968.

Typical monocytes from normal cattle contained a kidney-shaped nucleus with small, irregularly shaped masses of chromatin. Mitochondrial profiles were more numerous and smaller than in normal bovine lymphocytes. The cytoplasm showed short ergastoplasmic sacs; the lysosomes were small, round or teardrop-shaped, and sparse. Cisternal and vesicular Golgi membrane elements were usually prominent in the region of nuclear indentation. Many intermediate forms between monocytes and lymphocytes were observed, which were difficult to categorize. Lymphocytes of preleukemic cattle showed anomalous nuclear projections, similar to those found in the Burkitt lymphoma. These projections involved the nuclear membrane and were seen mainly as vesicular or tubular evagination. Heterochromatic material was not obvious in these projections. A few vesicular projections contained aggregates of electron-opaque material.

69-1270 IMMUNOELECTROPHORETIC FINDINGS IN SERA OF CATTLE AFFECTED WITH BOVINE LEUKOSIS. (E.) Trainin, Z. (Vet. Inst., Bet Dagan, Israel). Bibl. Haemat. 30:214-216, 1968.

The "γM" line (representing the macroglobulins in human sera) was absent in 12 sera from leukotic cattle (proven positive or suspect by hematological examination), but was present in sera from hematologically normal cattle of the same herd. This γM line was also absent in sera from 5/6 cows with histologically confirmed bovine leukosis; in 1/6 (in which hematological examination was twice negative in vivo and again at slaughter, but tumors were found and histologically confirmed), this line was extremely weak. Control sera from 40 cows with various chronic conditions showed a clear γM line.

69-1271 EARLY DETECTION OF THE LESIONS OF BOVINE LYMPHOSARCOMA. (E.) Dungworth, D. L. (U. California, Davis), G. H. Theilen, and J. M. Ward. Bibl. Haemat. 30:206-211, 1968.

Results of complete necropsy examinations of 40 cows with lymphosarcoma led to the conclusion that early lesions can be detected by histological examination of the major lymph nodes, heart, abomasum and uterus.

69-1272 THE IN VITRO GROWTH PATTERNS AND MORPHOLOGICAL CHARACTERISTICS OF LEUKOCYTES FROM LEUKEMIC, LYMPHOSARCOMATOUS AND NORMAL CATTLE. (E.) Dunne, H. W. (Pennsylvania State U., University Park), M. E. Kmetz, S. Yilmazer, R. D. Schultz, L. C. Griel and C. D. Clark. Bibl. Haemat. 30:228-230, 1968.

Studies of cells from milk and blood of normal and leukemic cows (1/2 was leukemic without lymphosarcoma, the other was leukemic with generalized lymphosarcoma) showed that the WBC (particularly the lymphocytes) initially developed through a similar monocytic pattern. After the formation of macrophages, cells from normal cows continued nuclear division to form large numbers of giant cells; cells from the leukemic cow (without generalized lymphosarcoma) formed very few giant cells, and then only when bacteria or similar antigens were added.

69-1273 KARYOMETRIC INVESTIGATIONS OF LYMPH NODES AND LEUKOTIC CELLS IN BOVINE LEUKOSIS. (E.) Ueberschär, S. (Vet. Hosp., Hannover, Germany). Bibl. Haemat. 30:234-236, 1968.

Mean nuclear vol. in peripheral blood and lymph node lymphocytes from 23 cattle with preleukotic lymphocytosis, was significantly larger than nuclear vol. in lymphocytes from 15 normal cattle. A further increase in nuclear vol., possibly indicating neoplastic transformation, was seen in lymphocytes from 18 animals with tumorous leukosis.

69-1274 ISOLATION, IMMUNODIFFUSION, IMMUNOFLUORESCENCE, AND ELECTRON MICROSCOPY OF A SYNCYTIAL VIRUS OF LYMPHOSARCOMATOUS AND APPARENTLY NORMAL CATTLE. (E.) Malmquist, W. A. (U.S. Dept. Agric., Ames, Iowa), M. J. Van Der Maaten and A. D. Boothe. Cancer Res. 29(1): 188-200, 1969.

A viral agent isolated from cattle with lymphosarcoma induced the formation of syncytia in bovine embryonic spleen cell (BESP) cultures. Syncytia also formed when infected BESP cells were added to rabbit kidney or rabbit cornea cells. The agent was cell-associated and transmissible at very low dilutions with cell-free filtrates. Precipitin lines were produced by immunodiffusion when the antigen from infected cells was tested against sera from lymphosarcomatous and apparently normal cattle. Buffy coat cells and cellular elements in milk from 5 apparently normal cattle whose sera gave positive precipitin reactions, and cells from 11 non-reactive offspring of reactive dams, also contained the virus. The immunodiffusion test also showed that a carrier state may have existed for several yr. without the development of clinical symptoms. Fluorescent conjugates prepared with precipitating sera gave specific staining reactions with infected cells, while non-precipitating sera did not. Electron microscopy of infected cells revealed virus-like particles budding at the cell membranes in a manner resembling the avian and murine leukemia viruses. Morphologically these virus-like particles resembled the mouse mammary tumor virus. The absence of transformation in infected cells (during prolonged incubation periods) and of virus-related antigens in cells that did not form syncytia, suggested that an immune mechanism (rather than proliferation of neoplastic cells) may be the actual cause of lymphosarcoma.

69-1275 QUANTITATIVE DOSE-RESPONSE RELATIONSHIPS OF MURINE SARCOMA VIRUS (MOLONEY) IN BALB/c MICE. (E.) Blumenschein, G. R. (NCI, Bethesda, Md.) and J. B. Moloney. J. Nat. Cancer Inst. 42(1):123-133, 1969.

In newborn and weanling BALB/c mice inoc. with serial dilutions of Moloney sarcoma virus (MSV), patterns of tumor development (rhabdomyosarcomas at the inj. site) were reproducible. The latent period from MSV inoc. to tumor development was proportional to the admin. MSV dose. In weanling mice, patterns of tumor growth and regression were predictable (21 days after MSV inoc., a high percentage had developed tumors and were in the complete regression phase). Studies of MSV recovery from the tumors showed a 3-day latent period, followed by a 5-day log growth phase. The MLV content of the tumors (which was directly related to the initial virus dosage and, within each dosage group, to the size of the tumors) decreased as the tumors regressed. Spleen wt. (as a proportion of body wt.) showed a bimodal curve, with peaks at 12 and 28 days after MSV inoc.; sarcoma-inducing virus was recoverable from spleens in both peaks.

69-1276 THE POSSIBLE ROLE OF VIRUSES IN HUMAN CANCER OF THE BREAST. (E.) Feller, W. F. (Georgetown U., Washington, D. C.) and H. C. Chopra. Amer. Surg. 34(12):840-845, 1968.

Thin sections of 28 human breast cancers, or centrifuged pellets of milk from 43 normal lactating women and 8 lactating women with breast cancer (active or previously treated), were examined under the electron microscope. Intracytoplasmic virus-like particles (VLP) were seen in 12/28 breast cancers (43%), 5/8 milk samples from breast cancer pts. (62%) and 7/43 specimens of normal milk (16%). These VLP were small (av. over-all diameter of about 30 mμ), with an electron-dense nucleoid surrounded by a double limiting membrane. Two other milk specimens from normal women showed VLP: larger particles resembling the mouse mammary tumor virus in 1/2, and particles morphologically resembling herpes virus in 1/2.

69-1277 OBSERVATIONS ON A CELL LINE PRODUCING MAMMARY TUMOR VIRUS. (E.) Sykes, J. A. (U. California Coll Med., Irvine), J. Whitescarver and L. Briggs. J. Nat. Cancer Inst. 41(6):1315-1327, 1968.

Preliminary tissue culture and electron microscopic studies of the cells of ATCC #CCL-51 revealed large numbers of "coated vesicles" associated with the Golgi apparatus in the cytoplasm of mammary tumor virus (MTV)-producing cells, and (unexpectedly) a relatively small number of Type A particles. No specific changes in cellular morphology could be related to MTV production. Cells of this line had been actively producing tumor-inducing MTV since the line was initiated in 1962 from a spontaneous mammary tumor of a (C57BL x Af)F_1 female mouse.

69-1278 METHODS FOR DETECTION OF ANTIBODY TO THE MAMMARY TUMOR VIRUS. (E.) Fink, M. A. (NCI, Bethesda, Md.), W. F. Feller and L. R. Sibal. J. Nat. Cancer Inst. 41(6):1395-1400, 1968.

Rabbit and rhesus monkey antisera against mammary tumor virus (MTV) from naturally infected C3H/HeN mice, were capable of neutralizing MTV. Sera from C3HfB mice, immunized with MTV-containing milk from C3H/HeN mice, were also very inhibitory. One strong precipitin line with MTV (sometimes a weak second line) was seen consistently with 3 BALB/c mouse antisera and 7 C3H antisera. Immunodiffusion tests (performed with C3HfB, C3H/HeN, BALB/c and C57BL mouse milk or purified fractions) repeatedly showed the expected positive or negative precipitin reactions. Two or 3 precipitin lines were produced with primate antisera and 1 or 2 lines with mouse antisera. MTV antigen did not react with monkey anti-mouse Rauscher leukemia antibody, nor did the Rauscher antigen react with the MTV antibody. Hemagglutination with cells prepared with ficin-treated MTV showed titers of 1:128 with rabbit antiserum; 1:64 with monkey antiserum and 1:8 with C3H mouse antiserum. The hemagglutination properties of these sera were removed by treatment with purified MTV and skim milk containing MTV, but not by skim milk without MTV.

69-1279 INVESTIGATION OF HUMAN MALIGNANT TUMORS IN INDIA FOR SIMIAN VIRUS 40 ETIOLOGY. (E.) Shah, K. V. (Johns Hopkins U., Baltimore, Md.). J. Nat. Cancer Inst. 42(1): 139-145, 1969.

Sera from 975 cancer pts. (530 males, 445 females; including 25 children under 10) in 10 cities of India, within the known limits of distribution of the rhesus monkey, were screened for virus-neutralizing and "tumor" (T) antibodies to SV40. None of these pts. had received polio vaccine. Virus-neutralizing antibodies with low titers were seen in 52/975 sera (5.3%); the sera were distributed in all age groups (except the children under 10). The prevalence of neutralizing antibodies was about the same in all geographical localities; in fact, the combined prevalence of these antibodies for all localities in Uttar Pradesh (3.7%), where rhesus monkeys are most prevalent, was below the over-all value. Analysis of sera from localities where at least 1 serum with protective activity had been found, showed about the same prevalence of neutralizing antibodies in all types of cancer except cancer of the bladder (5/11 sera were positive). Indirect fluorescent antibody tests demonstrated no T antibodies to SV40 in any of these sera.

69-1280 ESTABLISHMENT OF A CELL LINE FROM AN INBRED MOUSE STRAIN FOR VIRAL TRANSFORMATION STUDIES: SIMIAN VIRUS 40 TRANSFORMATION AND TUMOR PRODUCTION. (E.) Takemoto, K. K. (NIAID, Bethesda, Md.), R. C. Y. Ting, H. L. Ozer and P. Fabisch. J. Nat. Cancer Inst. 41(6): 1401-1409, 1968.

A line of predominantly epithelial-like cells (designated AL/N) was established from embryonic cells from the inbred AL/N mouse strain. This cell line and 2 sublines of epithelial and fibroblast-like morphology (designated AL/N-E and AL/N-F, resp.) were tested for susceptibility to SV40 transformation. The AL/N line was sensitive to SV40; the AL/N-E cells were more susceptible than the AL/N-F cells. Normal and SV40-transformed AL/N cells did not induce tumors in AL/N mice, but SV40-transformed cells produced tumors in immunologically incompetent (irradiated or thymectomized) syngeneic hosts. AL/N cells transformed in vitro by SV40 showed the transplantation antigen.

69-1281 ELECTRON MICROSCOPIC STUDY OF POLYOMA-INDUCED SALIVARY GLAND TUMORS, WITH SPECIAL REFERENCE TO CELL-VIRUS INTERACTIONS. (E.) Imamura, M. (Sapporo Med. Coll., Japan). J. Nat. Cancer Inst. 41(6):1265-1283, 1968.

Polyoma virus (PV)-induced salivary gland tumors of AKR mice (studied by electron microscopy) occasionally contained many intranuclear virus particles (approx. 42 mμ in diameter) of less density and with a vague contour than virus particles in macrophages. Similar particles were often observed in close contact with chromosomes of tumor cells undergoing mitosis. The fine structure of virus-containing tumor cells was little different from that of cells containing no PV. A few macrophages contained numerous intracytoplasmic virus particles (38 mμ in diameter); these were mostly associated with phagosomes or large vacuoles and frequently showed a crystalline arrangement. Larger virus particles (50-60 mμ) with an outer coat, and long filaments were also observed. The presence of the filament in dividing tumor cells may indicate the coexistence of cell mitosis and virus multiplication.

69-1282 EFFECT OF ANTI-HAMSTER THYMOCYTE SERUM ON PAPOVAVIRUS SV40-INDUCED TRANSPLANTATION IMMUNITY. (E.) Tevethia, S. S. (Baylor U. Sch. Med., Houston, Tex.), G. R. Dressman, R. N. Lausch and F. Rapp. J. Immun. 101(6):1105-1110, 1968.

The effects of rabbit anti-hamster thymocyte serum on SV40-induced transplantation immunity were studied in weanling hamsters. When the antiserum was admin. during the period of virus immunization, it prevented the sensitization of the animals to virus-induced transplantation antigens (treated animals did not reject SV40-transformed hamster cells). Animals immune to SV40-transformed cells also failed to reject a challenge of transformed cells after treatment with the antiserum. In antiserum-treated animals bearing tumors induced by SV40-transformed cells, the synthesis of antibodies against the T antigen of SV40 was comparable to the antibody synthesis noted in untreated animals with similar tumors.

69-1283 LACK OF RELATIONSHIP BETWEEN VIRUS-SPECIFIC SURFACE AND TRANSPLANTATION ANTIGENS IN HAMSTER CELLS TRANSFORMED BY SIMIAN PAPOVAVIRUS SV40. (E.) Tevethia, S. S. (Baylor U. Sch. Med., Houston, Tex.), G. Th. Diamandopoulos, F. Rapp and J. F. Enders. J. Immun. 101(6): 1192-1198, 1968.

The relationships between the surface (S) and transplantation antigens in SV40-transformed hamster cells were studied by transplant rejection tests in weanling hamsters, and by investigations of the ability of X-irradiated cells to prevent SV40 tumor induction in newborn hamsters. Detectable levels of transplantation antigens were found only in those cells that contained detectable levels of virus-specific tumor (T) and S antigens. Transplantation antigens were not found in cells synthesizing only the S antigen, or in cells synthesizing neither the S nor the T antigen. It is suggested that the S antigen detected (by immunofluorescence) in cells not synthesizing the T antigen is not identical to the SV40 transplantation antigen involved in protection or rejection phenomena.

69-1284 COMPARATIVE ELECTRON MICROSCOPIC STUDIES ON JUVENILE AND ADULT BOVINE LEUKOSIS. (E.) Winqvist, G. (Roy. Vet. Coll., Stockholm) and G. Hugoson. Bibl. Haemat. 30:200-202, 1968.

See also abstract nos.: 1128,1129,1151,1156,1170,1171

69-1285 METHODS OF COLLECTING MATERIALS FOR RETROSPECTIVE ANALYSIS OF THE PREVALENCE OF MALIGNANT DISEASES IN CHILDREN. (Pol.) Božek, J. (Inst. Mothers Child. Care, Warsaw), J. Kurpios and L. Skorochodzki. Przegl. Epidem. 22(3):447-450, 1968.

A preliminary paper, describing the methods (questionnaires filled out by hospitals and interviews of parents) used in gathering data on the incidence of leukemia and solid tumors in children (up to 14 yr.) in the Bialystok province between 1956-1965. A sample questionnaire and a list of the hospitals and institutions taking part in the study are presented. No results are given.

69-1286 EPIDEMIOLOGIC ASPECTS OF NEOPLASTIC DISEASES IN ISRAELI IMMIGRANT POPULATION. II. MALIGNANT NEOPLASMS IN CHILDHOOD. (E.) Virag, I. and B. Modan (Tel Hashomer Gov. Hosp., Israel). Cancer 23(1):137-141, 1969.

From 1961-1965, 594 new cases of cancer were seen in children under 15 living in Israel. The mean annual incidence was 14.1/100,000; the male:female ratio was 1.2:1. The most frequent tumors (67.2% of the total) were leukemia, brain tumors and malignant lymphoma, with incidence rates of 3.9, 3.0 and 2.7/100,000, resp. The total tumor incidence was higher in Arab than in Jewish children (16.4 and 13.7/100,000, resp.) except in the 0-1 age group (possibly reflecting underdiagnosis in the Arab children), with the greatest differences in the incidence rates of Wilms' tumor and malignant lymphoma (Arab:Jewish ratios of 2.4:1 and 1.5:1, resp.). This is in contrast with available data regarding adults. Also in contrast with reports on the adult population was the minimal ethnic difference seen in Israeli-born Jewish children whose fathers were born in Israel, Asia or Europe and America. In children whose fathers were born in North Africa, however, the patterns were different, with a very low total cancer incidence at age 0-1 (6.3; this might have reflected underdiagnosis) and a 2-fold excess incidence at age 10-14 (21.8). In this group, the tumor frequency (all ages combined) was also changed; lymphoma was the most frequent, followed by leukemia and brain tumors, with incidence rates of 3.5, 3.0 and 2.3/100,000, resp.

69-1287 CANCER AS A SCOTTISH PROBLEM. (E.) Haddow, A. J. (U. Glasgow, Scotland). Scot. Med. J. 13(10):338-348, 1968.

In 1962-1966, the most prevalent tumors in Scotland were respiratory cancer in males (31% of all cancers, 40% of all cancer deaths; in females, 6% and 9%, resp.) and breast cancer in females (23% and 17%, resp.); g.i. cancer was second (25% of all cancers and 28% of all cancer deaths in males; 23% and 35%, resp., in females). Scotland showed the highest known respiratory and intestinal cancer mortality in both sexes. Cancer was the second most important cause of death (19% of all deaths) in children 1-14 yr. old in Scotland (excluding deaths from accidents) in 1962-1966. In Scotland, total standardized cancer mortality in males rose steadily from 1217/million in 1901 to 2417/million in 1966; in females, the mortality rate rose until 1931 (1616 to 1957/million), then fell to 1777/million in 1966. Standardized mortality rates/million from specific cancers (11 sites for males, 13 for females) from 1911-1966 are tabulated. Cervix cancer mortality rose significantly from 1931-1961 (55-88 million); ovary cancer mortality rose throughout the study period (between 4- and 5-fold). Kidney cancer mortality (both sexes) rose slightly; breast cancer mortality (females) remained about the same. Throughout this period, significant increases were seen in standardized mortality rates from leukemia (5-fold in males, 4-fold in females), pancreas cancer (4-fold and nearly 5-fold, resp.) and prostate cancer (7-fold); g.i. cancer mortality increased until 1931 (females) or 1941 (males), then declined to below the 1911 rates (as of 1966). A highly significant correlation was seen between the increases in mortality from bladder cancer (nearly 3-fold in males, over 2-fold in females) and respiratory cancer (52-fold and 11-fold, resp.). In males, 1966 mortality from respiratory cancer was equivalent to 1908 mortality from pulmonary tuberculosis (7.8% and 7.9% of all deaths, resp.). In 9 cities and large towns in Scotland, respiratory cancer caused 8.5-12.3% of all male deaths (and 9.7-14.8% of all deaths in men over 45) in 1966. The possible roles of smoking and air pollution are briefly mentioned.

69-1288 MULTIPLE PRIMARY CANCERS (100 CASES). (Fr.) Abbes, M. (Diag. Treat. Ctr. C.A.C., Nice, France), M. Namer and Th. Pierotti. Sem. Hop. Paris 44(54):3387-3392, 1968.

Multiple primary tumors were seen in 100/2462 pts. (about 4%) registered at this center in 1961-1967. The group included 45 men and 55 women. In the 90 pts. with double primary tumors, av. ages at the diagnosis of the first and second tumors were 59 and 64 yr., resp.; 7/90 were identified simultaneously and the others after intervals of 3 yr. or less (44/90; less than 1 yr. in 26/44), 4-10 yr. (24/90) or 11-44 yr. (15/90). In the 10 pts. with triple primary tumors, av. ages at the diagnosis of the first, second and third tumors were 56.6; 62 and 66 yr.; resp.; in 4/10, the first 2 tumors were identified simultaneously. The most frequent sites of the 210 multiple primary tumors were the breast (51), skin (28), lip (16), cervix (14) and lung

(12). The most frequent combinations of double primary tumors were breast + breast (bilateral tumors only), breast + female genital (not developing simultaneously), and lung + ear-nose-throat (ENT), followed by female genital + g.i., ENT + ENT, and ENT + g.i. tumors. Frequencies of breast, skin, lip and cervix cancer were the same in each group; but no lung tumors were noted in the 10 pts. with triple primary tumors. Criteria for the identification of multiple primary tumors are presented. Among the tumors excluded from consideration were skin cancers developing on preneoplastic lesions. The roles of predisposing factors (heredity and radiation are mentioned) were not evaluable in these pts.

69-1289 ASSOCIATION OF PRIMARY NEOPLASMS OF THE SMALL INTESTINE WITH OTHER NEOPLASTIC GROWTHS. (E.) Alexander, J. W. (U. Cincinnati Coll. Med., Ohio) and W. A. Altemeier. Trans. Sth. Surg. Ass. 79:396-402, 1967.

Examination of 9721 consecutive autopsies performed over 15 yr. revealed primary neoplasms of the small intestine in 112 cases (1.15%); 7 tumors were malignant, 72 were benign and 33 were carcinoid tumors. A wide variety of other independent tumors occurred in 83/112 (74%): this included multicentric tumors of the same types. Another series of 1000 autopsies revealed 204 benign and 180 malignant tumors of all types. The association of small intestine neoplasms and other independent tumors was studied in cancer pts. over 50 from both groups. In the pts. with small intestine tumors, the frequency of associated, independent neoplasms of any type was 76% (77/101; 53/77 associated neoplasms were benign), compared to 31% (92/295) in pts. with primary neoplasms of all origins. The difference between these 2 groups was significant. The highest frequency of associated neoplasms (benign and malignant) was 90% (26/29), in pts. with carcinoid tumors of the small intestine. The data suggested the possible existence of common etiologic factors for small intestine tumors (especially carcinoid tumors) and tumors developing at other sites.

69-1290 CANCER AND MYOCARDIAL INFARCT. STATISTICAL RELATIONSHIP IN 2500 AUTOPSIES. (Fr.) Chomette, G. (Paul-Brousse Anat. Path. Serv., Villejuif, France), M. Auriol, Y. Pinaudeau and C. Brocheriou. Bull. Cancer (Paris) 55(2):299-302, 1968.

From a series of 2500 autopsies, 1136 pts. over 70 (339 men, 797 women) were selected. Myocardial infarct was seen in 26.7% (105/339 men, 199/797 women) and cancer in 20.5% (113/339 and 121/797, resp.) of the group. In pts. without cancer, the incidence of myocardial infarct was 28.5% (258/902 pts.), 31% in men and 27% in women; in pts. with cancer, the incidence of myocardial infarct was 19.6% (56/234), 24% in men and 15.7% in women. This incidence of myocardial infarct with cancer was about the same in each age group, except for the small group of women over 90. The incidence of myocardial infarct was above this over-all value in pts. with cancer of the prostate (12/43 = 27.9%) or breast (5/18 = 38.4%) and, to a lesser extent, cancer of the stomach (9/49 = 22.5%) or bronchus (5/20 = 25.0%), but the inverse correlation between cancer and myocardial infarct was evident in pts. with colon cancer (6/49 = 12.8%) and various other tumors (10/78 = 12.6%). It is pointed out that both arteriosclerosis and cancer of the breast and prostate reach their max. frequencies in the same age groups (postmenopausal women and climacteric men).

69-1291 HEMATOPOIETIC NEOPLASMS AND RELATED CONDITIONS IN Praomys (Mastomys) natalensis. (E.) Snell, K. C. (NCI, Bethesda, Md.) and H. L. Stewart. J. Nat. Cancer Inst. 42(1):175-202, 1969.

Examination of an autopsy series of aged animals of Families A and B revealed interrelated neoplastic, reactive and inflammatory diseases of the hematopoietic tissues in 22/213 old animals; only 2/22 with hematopoietic tumors were under 2 yr. old, the others were 26-38 mo. old. Most of these hematopoietic tumors were of the lymphosarcoma or reticulum cell sarcoma type; none of the animals showed leukemic blood pictures or hematopoietic tumors originating in the thymus (only 1 such tumor invading the thymus was noted). The 12 reticulum cell sarcomas were all classified as Dunn Type B (none were Types A or C) and 11/12 were seen in animals of Family A. The single plasma cell myeloma seen in this series was readily transplanted by s.c. inoc. into Mastomys natalensis (the age of the recipients is not stated) and had been carried for 34 passages at the time of report. Attempts to transplant 3 other tumors to Mastomys or (in 1 case) newborn mice were unsuccessful. The relationships between Type B reticulum cell sarcoma, autoimmune disease, hypergammaglobulinemia and dysproteinemia in this species were discussed, and compared to similar relationships seen in mice of the SJL/J and NZB/BL strains.

69-1292 CANCER IN HOUSEHOLDS: A HUMAN-CANINE RETROSPECTIVE STUDY. (E.) Schneider, R. (California State Dept. Publ. Health, Berkeley), C. R. Dorn and M. R. Klauber. J. Nat. Cancer Inst. 41(6):1285-1292, 1968.

A 2-yr. survey (July, 1963 through June, 1965) was conducted in Alameda County (California) to determine the association between canine and human cancer; 947/1229 eligible households (with at least 1 dog over 1 yr. old) were studied. The canine material included 447 histologically verified different primary malignant tumors. Human cancer was reported in 52/427 (12.2%)

households with canine tumors and in 38/520 households (7.3%) without canine tumors; 26/54 (48.1%) and 21/39 (53.8%) of the human tumors, resp., were histologically verified. A statistical method, designed to detect differences in relative risk in excess of 3-4-fold, showed no significant association of human and canine tumors, even in households in the highest risk groups (whose members were predominantly in the 60-and-over age group). The association of specific histological types and sites of human and canine tumors could not be determined, because of the small number of histologically verified human tumors; however, 5 canine cutaneous melanomas were associated with human tumors of the g.i. tract, and it is pointed out that most of the 48 canine melanomas were of the head region (the area most in contact with humans).

69-1293 MORPHOLOGIC AND BIOLOGIC CHARACTERISTICS OF THE CANINE CUTANEOUS HISTIOCYTOMA. (E.) Taylor, D. O. N. (California State Dept. Pub. Health, Berkeley), C. R. Dorn and O. H. Luis. Cancer Res. 29(1):83-92, 1969.

A 3-yr. survey (July, 1963-June, 1966) of specimens obtained from dogs at 2 California counties disclosed 4842 tumors, including 520 cutaneous histiocytomas (CH: 10.7% of all canine tumors; 280 from Alameda County, 240 from Contra Costa County). The incidence of CH and other benign skin tumors (843 cases) in the canine population of Alameda County was 116.7 and 351.2/100,000 dogs, resp. The CH incidence fell with age (about 50% were seen in dogs less than 2 yr. old), but the incidence of the other benign skin tumors rose with age. No significant differences in the relative CH risk were seen between males and females, or between intact and spayed females. No seasonal variations were noted. The CH risk was higher in purebred dogs than in crossbred dogs; a significant excess risk was noted in boxers and dachshunds, but poodles showed a significantly reduced risk. The CH were found over most of the body, but 29% (152/520) developed on the head, particularly on the pinnae of the ears. The benign nature of CH was confirmed by a follow-up study of 230 dogs; none developed widespread metastases or died of CH, and recurrences were rare. Efforts to transmit CH (to fetal puppies, young dogs or hamsters) or demonstrate etiologic agents were unsuccessful.

69-1294 EPIDEMIOLOGICAL STUDIES OF ACUTE CHILDHOOD LEUKEMIA: A SURVEY OF CUYAHOGA COUNTY, OHIO. (E.) Browning, D. (Case Western Reserve U., Cleveland, Ohio) and S. Gross. Amer. J. Dis. Child. 116(6):576-585, 1968.

From August, 1955-July, 1965, 174 fatal cases of acute leukemia (AL) were seen in children (14 and under) residing in Cuyahoga County; the incidence was 3.45/100,000 children/yr. The 168 pts. evaluated further included 15 Negro (N) children (8.9% of the group, although the total Cuyahoga County population was 15.6% N) and no Orientals; the male:female ratio was 1.3:1. The total AL incidence in white (W) and N children was 3.85 and 1.63/100,000, resp.; this racial difference was significant at all ages except in boys aged 10-14. The AL incidence in W and N children living in Cleveland proper was 3.15 and 1.42, resp., compared to 4.30 and 12.60 (2 cases), resp., in the suburbs. The incidence was lower than expected in W and N persons of low socioeconomic status, and higher than expected in W suburban residents of higher socioeconomic status (the N children living in the suburbs could not be evaluated, since only 1596 N children lived in the suburbs during this study period, with 2 cases of AL. The residential difference was significant only for children under 10. The residential and socioeconomic differences may have reflected the greater availability of diagnostic and therapeutic services for persons of higher socioeconomic status (which includes more residents of the suburbs than of Cleveland proper). Down's syndrome was seen in 4/168 and other major congenital anomalies in 3.5% of the group; 2 pts. were identical twins, and other family histories of leukemia (none in siblings) were obtained for 12/163 evaluable cases (6.3%). No seasonal differences in onset and no significant temporospatial relationships were noted.

69-1295 A SURVEY OF LEUKAEMIA IN IRAQ. A FIVE-YEAR RETROSPECTIVE STUDY. (E.) Al-Damluji, S. F. (U. Baghdad, Iraq), B. W. Subhiyah and Q. S. Al-Awqati. J. Egypt. Med. Ass. 51(4):312-318, 1968.

A search of the records of the Republican Hospital (Baghdad) from 1961-1965 (inclusive) disclosed 230 cases diagnosed as leukemia, but only 172 cases were verified. This group included 5 children in the 0-9 age group and 44 pts. in the 10-19 age group (but it is noted that children under 12 are usually referred to another hospital). The histological diagnosis was acute leukemia in 93/172 (54.2%; including all of the children and 39/44 aged 10-19), chronic lymphatic leukemia in 29/172 (16.8%; including 5/44 aged 10-19) and chronic myeloid leukemia in 50/172 (29.0%); mean ages in these groups were 26.3, 42.7 and 30.2 yr., resp. The male:female ratios in these groups were 1.7:1, 4.8:1 and 1:1, resp. The relative incidence of chronic lymphatic leukemia in this Iraqi group (16.8%) was intermediate between the very low values reported in the Far East (2-5% in 5 studies) and the higher values reported in the U.S.A. and Britain (23.3-33.0% in 4 studies); in 1 group each from Lebanon and Egypt, the relative incidences were 24.5% and 29.8%, resp.

69-1296 CONTRIBUTION TO THE STUDY OF THE GEOGRAPHIC PATHOLOGY OF BURKITT'S DISEASE. THE FIRST CASES REPORTED IN THE KATANGA PROVINCE. (Fr.) De Scoville, A. and R. Parmentier. Bull. Acad. Roy. Med. Belg. (Ser. VII) 8(8):616-643, 1968.

An extensive description of the geography of Katanga is given (with 1 map), together with the histories of the first 4 known cases of the Burkitt lymphoma in this area, 3 boys (age 6.5-11 yr.) and 1 man (age 50 yr.). These pts. came from 3 towns (Katola, Kaniama and Kisenge) in the west-central area of the lowlands (2/3 towns were in valleys at an altitude of 860 or 900 m, about 300 m below the rest of the area), with an av. annual temperature of 24° C, a population density of 3-4 persons/km^2, and a dry (winter) season of 4 or 5 mo. These towns were all situated on the banks of 2 rivers (Lulua or Lubilash), draining an extensive swamp. This lowland area is described as a savanna, extensively flooded for 7-8 wk. after the rainy season (av. rainfall of 1200 mm). Malaria is endemic.

69-1297 MORTALITY FROM HODGKIN'S DISEASE IN THE UNITED STATES. EVIDENCE FOR THE MULTIPLE-AETIOLOGY HYPOTHESIS. (E.) Cole, P. (Harvard Sch. Pub. Health, Boston, Mass.), B. MacMahon and A. Aisenberg. Lancet 2(7583): 1371-1375, 1968.

Hodgkin's disease mortality rates (age- and sex-adjusted av. annual mortality/100,000 white population) in the U.S. were studied from the 1949-1954 and 1959-1961 data. In the South (North and South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Louisiana, Arkansas, Oklahoma and Texas; all below 37° North Latitude), the 1949-1954 mortality rates at age 15-34 were 1.19 in males and 0.59 in females, compared to 1.98 and 1.25, resp., in the rest of the country (relative risks compared to the rest of the country, were 0.60 and 0.47, resp.). Mortality rates at age 45 and over were about the same in the South as elsewhere; mortality rates at age 35-44 were intermediate between these 2 values. A similar geographical variation was seen in the 1959-1961 data, although all mortality rates had increased. Mortality rates in 1949-1954 were also low in the Rocky Mountain area (Montana, Idaho, Wyoming, Colorado, Utah, Nevada, Arizona and New Mexico), at both ages 15-34 and 45 and over; this was attributed to incomplete reporting of the data, but the 1959-1961 mortality rates in this area showed a pattern of relatively low mortality (at age 15-34 only) compared to that seen in the South. The data are interpreted as supporting the hypothesis for a "dual etiology" of Hodgkin's disease.

69-1298 DISTRIBUTION OF BLOOD AND SERUM GROUPS IN CANCER PATIENTS. (Ger.) Scholz, W. (U. Düsseldorf, Germany), L. Gilly and G. Gilly. Strahlentherapie 136(4):448-453, 1968.

In 600 pts. with cancer (353 female genital, 66 breast, 71 bronchus, 110 other types) and 1216 normal control subjects, the distribution of ABO blood groups was: A in 42.0% and 42.6%, resp.; B in 14.3% and 10.7%, resp.; AB in 5.3% and 5.1%, resp.; and 0 in 38.3% and 41.6%, resp. A significant increase in group A at the expense of 0 was seen in 229 pts. with cervix cancer (50.6% and 27.8%, resp.); in the pts. with bronchial cancer, group 0 was significantly increased at the expense of A (49.3% and 35.3%, resp.). Studies of the distribution of Rh, MN, P, Gm and haptoglobin genotypes and phenotypes showed only 1 difference that was statistically significant at the 5% level. The P genotype was P_1 in 74.8% of the entire group of cancer pts. and 77.8% of the controls, while 25.2% and 22.2%, resp., showed the P_2 genotype. The significant change was seen in the pts. with bronchial cancer, who showed a decrease in the P_1 genotype and an increase in the P_2 genotype (to 64.8% and 35.2%, resp.).

69-1299 CARDIAC METASTASES. (Fr.) Roy, J. (Hotel-Dieu, Quebec, Canada). Union Med. Canada 98(1):81-82, 1969.

A 10-yr. survey of autopsies performed at the Hotel-Dieu (Quebec) disclosed malignant tumors in 605/1762 cases. Intramural and subendocardial metastases of the heart (excluding leukemic infiltration, or pericardial extension from lung or breast cancer) were noted in 43/605 pts. (7.1%); 20 males and 23 females, aged 12-84 yr. (av. 58 yr.). The incidence of heart metastases was 16.6% in breast cancer (7/42 pts.), 9.6% in pancreas cancer (3/31), 21.5% in liver and biliary tract cancer (3/14), 23.0% in lip and mouth cancer (3/13) and 12.0% in lymphoma (3/25); the incidence was lower in pts. with cancer of the bladder (2/28 = 7.0%), stomach (5/63 = 7.9%), colon (1/68 = 1.4%) or lung (3/69 = 4.3%). The incidence of heart metastases in pts. with other tumors could not be evaluated because of the small number of cases, but heart metastases were noted in 4/6 (66.6%) with melanoma of the skin, confirming other reports of a high incidence of heart metastases in this tumor. The left and right sides of the heart were involved in about the same number of pts. each.

69-1300 MALIGNANT NEOPLASMS OF THE CENTRAL NERVOUS SYSTEM, ONTARIO CANCER FOUNDATION CLINICS, 1950-1964. (E.) MacKay, E. N. (Ontario Dept. Health, Toronto, Canada) and A. H. Sellers. Canad. Med. Ass. J. 99(25):1245-1253, 1968.

The 1390 deaths from CNS tumors in Ontario from 1958-1964 (inclusive) were slightly over 2% of all cancer deaths (10-21% in males and females under 20; at least 10% in males aged 25-34); death rates in males and females (all ages) were 3.3 and 2.3/100,000 population, resp. A study of 1048 pts. with primary CNS tumors (excluding meningiomas, chordomas, pituitary tumors, neuroblastomas arising outside the CNS, and brain metastases), treated at 7 Ontario clinics in 1950-1964, showed peak distributions of the sub- and supratentorial brain tumors (24% and 76%, resp., of 948 tumors) at ages 5-9 and 50-55, resp. The most frequent supratentorial tumors were glioblastomas and astrocytomas (48% and 25%); in the subtentorial region, ependymomas, medulloblastomas and unverified tumors were about equally frequent (20-22% each). The distribution of brain tumors by both site and type changed significantly with age (ependymomas and medulloblastomas decreased, while glioblastomas, oligodendrogliomas and astrocytomas increased with age). The most frequent tumors in children (under 15) were cerebellar medulloblastomas; the most frequent tumors in pts. over 15 were frontal or temporal glioblastomas. Distribution of the 67 spinal cord tumors was about the same in adults and children; cervical and dorsal tumors were most frequent (33% and 19%, resp.). Ependymomas and astrocytomas were equally common at the cerevical level; ependymomas predominated at the lumbar level and below. Male:female ratios in pts. with brain and spinal cord tumors were 1.6:1 and 1.5:1, resp. The 33 tumors of other CNS sites included 16 pinealomas, 8 optic nerve or retinal tumors, and 5 craniopharyngiomas.

69-1301 CANCER OF THE NASO-PHARYNX IN NIGERIA. (E.) Martinson, F. D. (U. Coll. Hosp., Ibadan, Nigeria). J. Laryng. 82(12):1119-1128, 1968.

From 1961-1966, 56 cases of nasopharyngeal cancer were seen at the author's clinic. The incidence of this tumor could not be determined, because of the inadequacy of data on vital statistics for Nigeria, but nasopharyngeal tumors accounted for 24% of all upper respiratory tumors seen at the author's clinic, and available data suggested an over-all incidence in Nigeria of 1.4% of all malignancies. The male:female ratio in these 56 pts. was 5:3, only 1 pt. was under 10, with the peak incidence at ages 31-40 and 41-50 yr. (14 and 12 cases, resp.). Only 5 pts. were over 60; this small number may represent a lack of confidence of older persons in modern medicine, shorter life expectancy or other factors, but this tumor did affect a younger age group than in Europe, as well as showing a higher frequency than in Europe. Of these tumors, 70% were of epithelial origin; tumors of this type would still predominate even if the lymphoepitheliomas and transitional cell carcinomas were eliminated from the group. Possible etiologic factors are briefly discussed. It is suggested, in view of the prevalence of the Burkitt lymphoma in Nigerian children, that adolescents and adults previously exposed to the causative agent(s) may develop an immune state in which they become susceptible to carcinogens affecting the upper respiratory tract.

69-1302 PROGNOSIS OF LUNG CANCER DETECTED IN COMMUNITY-WIDE TUBERCULOSIS SURVEYS: AN ANALYSIS OF 906 CASES. (E.) Wilson, H. Med. J. Aust. 2(21):936-942, 1968.

Combined 10-yr. data (1953-1964) from 2 surveys and 5-yr. data (1958-1964) from another survey (2 were done in New South Wales, 1 in Western Australia) disclosed lung cancer in 906/7,938,067 chest X-rays. The detection rate was 1:8762, about the same in each of these surveys. The lung cancer incidence in Australian men is about 33/100,000; it is expected that no more than 10% of all cases of lung cancer in a community will be detected by community-wide X-ray surveys for tuberculosis. The number of cases was increased to 1330 by the addition of 324 clinical cases, who were studied because of the development of symptoms. The prognosis in these 324 pts. and the 906 cases detected by mass X-ray survey was about the same. Examination of the clinical histories of 300 of these pts. showed that less than 10% were nonsmokers. Factors that did not influence the survival significantly included cell type, age, sex, site, configuration, or previous X-ray abnormalities (tuberculous or non-tuberculous).

69-1303 GEOGRAPHIC PATHOLOGY OF THYROID CARCINOMA. (E.) Cuello, C. (U. Del Valle, Cali, Colombia), P. Correa and H. Eisenberg. Cancer 23(1):230-239, 1969.

A classification system for thyroid carcinoma is described, based on a detailed histological review of 229 specimens from Connecticut (Conn.), a low-goiter area (the association of goiter and cancer was not studied in these specimens) and 217 from Cali, Colombia, a high-goiter area (the goiter incidence is 45% in the general adult population). Examination of specimens of papillary (51), follicular (51), anaplastic (33) or medullary (9) thyroid carcinoma from 1 pathology department in Cali disclosed goiter in 58.8%, 78.4%, 96.9% and 33.3% of the specimens, resp. Chronic lymphocytic thyroiditis associated with papillary carcinoma was found in 33.9% of 53 specimens from Cali and in 44.2% of 61 specimens from Conn. The annual incidence rates of thyroid cancer (observed rates in Conn., expected rates in Cali; based on the total number of observed cases) were about the same for papillary carcinoma in Conn. and Cali (0.54 and 0.40, resp., in men; 1.49 and 1.45, resp., in women). A statistically significant excess of follicular carcinoma was noted in Cali (1.48 in men, 1.77 in women; in Conn., 0.21 and 0.62, resp.). An excess of anaplastic carcinoma was also noted in Cali (0.46 in men, 1.24 in women; in Conn., 0.18 and 0.43, resp.), but the number of cases was too small for statistical evaluation.

69-1304 NEPHROBLASTOMA (WILMS' TUMOR) AND CONGENITAL ANIRIDIA. (E.) Woodard, J. R. (U. Alabama, Birmingham) and M. K. Levine. J. Urol. 101(2):140-143, 1969.

A female infant with congenital aniridia and Wilms' tumor is described, bringing the total number of reported cases to 12. One sibling had died of neuroblastoma; 6 other siblings and the parents were normal. No family history of aniridia or other significant disorders was noted. The other 11 reported cases of this association also had aniridia of the non-familial (isolated) type, other congenital anomalies were frequent (the authors' pt. had 1 congenitally deformed ear). The incidence of congenital aniridia in 1 study (lower Michigan) was 1/64,448 living persons; about 33% of U.S. cases of aniridia were of the non-familial type, the others were apparently transmitted by an autosomal dominant gene. It is concluded that Wilms' tumor should be suspected in any infant with non-familial aniridia.

69-1305 BASAL CELL EPITHELIOMA AMONG JAPANESE. (E.) Miki, Y. (U. Osaka Sch. Med., Japan). Aust. J. Derm. 9(4):304-313, 1968.

Primary skin tumors (squamous or basal cell carcinoma or melanoma) were seen in 822/851,685 new dermatology cases admitted to 41 university hospitals in Japan from 1956-1960; 24% (200) of these tumors were basal cell carcinomas, accounting for 0.02% of the new dermatology cases. These Japanese hospitals were located at 30-45° North Latitude (NL). The skin tumor incidence was higher in the pts. admitted to the University of Osaka Hospital, which is in the southern part of Japan (35° NL): primary skin tumors were seen in 57/48,134 new dermatology cases, including 36 basal cell carcinomas (63% of the skin tumors, 0.08% of the new cases). The skin tumor incidence in these Japanese hospitals was lower than in the predominantly white pt. group seen at the University of Colorado, which is further north than Osaka (40° NL): the 1948-1958 records (about 600 new dermatology cases/yr.) disclosed 949 primary skin tumors, 45% (429) of which were basal cell carcinomas (6.5% of the new cases). In 88/200 Japanese pts. with basal cell carcinoma, the tumors were recognized by their conspicuous pigmentation (mostly from hypertrophic and melanotic melanocytes), which was not related to the tumor site or to the degree of exposure (to sunlight and other factors). About 10% of the pts. stated that the lesions had been present since childhood, but these statements were not always verified by examination of previous photographs of the pts. Mapping of the sites of 57 solitary basal cell carcinomas showed many tumors developing along the lines of the facial clefts. It is suggested that some inborn abnormality, present in the dermis or epidermis during fetal development at the time of closure of the facial cleft, may remain quiescent until stimulated by the sun or another external factor. The growth and development of other tumors seemed to be influenced by Langer's lines rather than the facial cleft lines.

69-1306 EPIDEMIOLOGY OF PRECANCEROUS LESIONS AND MALIGNANT TUMORS OF THE SKIN. VI. SARCOMAS OF THE SKIN. (Ger.) Jung, H.-D. (Dist. Hosp., Pasewalk/Ruhleben, Germany) and J. Kölzsch. Hautarzt 19(11):515-517, 1968.

The 2102 skin tumors identified at this center from 1953-1963 included 33 sarcomas, in 7 females (all adults) and 26 males (1 infant, 25 adults; 8/26 were under 50 and 8/26 were aged 60-69). The ratios of sarcomas to carcinomas (excluding basal cell carcinomas) and melanomas of the skin were 33/751 and 33/114, resp.; 5-6% of all sarcomas involve the skin (previously reported). These tumors involved the extremities in 17/33 (51.5%), the face in 8/33 (24.2%) and other sites in 8/33 (24.2%). Predisposing conditions were noted in 3 pts.; 1/3 developed a sarcoma at the site of an atheroma which had been removed surgically 3 times over 12 yr.; 1/3 developed a sarcoma on an electrical burn scar; and the only child in the group had a congenital sarcoma of the skin (removed at age 3 mo.) and a family history of cancer (in 3 generations on the maternal side, also the paternal grandfather).

69-1307 RARE TUMORS OF THE TONGUE: ANATOMO-PATHOLOGICAL STUDY (178 CASES). (Fr.) Micheau, C. (Gustave-Roussy Inst., Villejuif/Seine, France), R. Gerard-Marchant and Y. Cachin. Arch. Anat. Path. (Paris) 16(2):119-128, 1968.

From 1924-1967, 2109 tumors of the tongue were seen; 1931 (92%) were of the malpighian epithelioma type, 159 (7%) were benign tumors, and 19 (about 1%) were various other malignant tumors. The relatively rare malignant tumors included 2 mucinous adenocarcinomas, 2 undifferentiated carcinomas, 7 soft tissue sarcomas, 5 reticulum cell or lymphosarcomas and 3 unclassified tumors. The majority of the benign tumors and pseudoneoplastic lesions were classified as papilloma (46/159 = 28%), angioma (32/159 = 20%), "suction nodules" (29/159 = 18%), "salivary tumors" (22/159 = 14%) or rhabdomyoma (12/159 = 7%). The other 18 pts. with benign lesions included 2 young women with a schwannoma (1) and a lingual goiter (1), 1 woman with a dysembryoplastic cyst, and 1 infant with a congenital mesenchymoma, who are described in brief case histories. Most of the benign tumors were seen in younger pts. The microscopic pathology of the benign lesions and rare malignant tumors is discussed.

69-1308 ETHNIC DISTRIBUTION OF CANCER OF THE GASTROINTESTINAL TRACT IN MANITOBA. (E.) Choi, N. W. (U. Manitoba, Winnipeg, Canada). Amer. J. Pub. Health 58(11):2061-2081, 1968.

Data on g.i. cancer death rates in Manitoba (expressed as av. annual death rates/100,000 population; age-standardized for comparisons of the ethnic groups) were obtained by examination of 1956-1965 death certificates. Stomach cancer death rates (1727 cases) in Manitoba were 25.6 in males and 11.7 in females. These rates were much higher in the foreign-born (FB; 32.5 and 15.2, resp.) than in the native-born (NB; 17.7 and 7.8, resp.), particularly in immigrants from Scandinavia (especially Iceland and Sweden), the USSR (predominantly Ukrainian) and Poland. Stomach cancer death rates in the descendants of immigrants were intermediate between FB and NB values. Combined colon and rectum cancer death rates (1370 and 627 cases, resp.) were 23.5 in males and 19.9 in females (15.0 and 14.8, resp., for colon cancer; 8.5 and 5.1, resp., for rectum cancer). In these pts. the difference between FB and NB groups was less significant than in stomach cancer, though excess mortality was noted in USSR-born females and persons born in the British Isles (especially England) and the U.S.A. (this difference was of borderline significance). The standardized mortality ratios for colon and rectum cancer were significantly higher in the descendants of Eastern European immigrants than in either the FB or NB groups. The data suggested the importance of environmental factors (such as diet), rather than genetic factors, in the etiology of g.i. cancer.

69-1309 SOLID CIRCUMSCRIBED CARCINOMA OF THE BREAST. (E.) Schwartz, G. F. (U. Pennsylvania, Philadelphia). Ann. Surg. 169(2): 165-173, 1969.

From 1915-1955 (inclusive), about 3000 pts. with primary breast carcinoma were treated at the Columbia-Presbyterian Medical Center (New York City). About 2.5% of these tumors (80 tumors) were classified as solid circumscribed (medullary) carcinoma. In this group, the incidence of bilaterality (14%) was higher than usually described. The mean age of incidence in these pts. was 45.7 yr.; almost 50% of the pts. were under 45 (compared to 28% of the pts. with other forms of breast cancer) and 81% were under 55. The predilection of this tumor for younger women was also demonstrated by several additional cases in women under 30, seen since 1955.

69-1310 A NEW SELF-ADMINISTERED TEST FOR UTERINE CANCER: THE AYRE SCRAPE ASPIRATOR. (E.) Ayre, J. E. (Natl. Cancer Cytol. Ctr., Miami, Fla.). Med. Times 97(1): 151-161, 1969.

An apparatus and methods for its use (by the pt. at home or by the physician) are described. No false negative results were noted in 27 cell samples from pts. with confirmed invasive cancer. Evaluation of 200 cell samples from pts. with cervical dysplasia or carcinoma *in situ* (confirmed by repeatedly positive cytological findings) showed 10% false negatives using the self-admin. test (compared to 2% false negative results after standard cervical scraping tests performed by physicians).

69-1311 HISTOLOGIC TYPES OF SQUAMOUS-CELL CARCINOMA *IN SITU* OF THE CERVIX. (E.) Tweeddale, D. N. (U. Kentucky Med. Ctr., Lexington) and J. W. Roddick. Obstet. Gynec. 33(1):35-40, 1969.

Conization or hysterectomy specimens of 65 squamous cell carcinomas *in situ* of the cervix from nonpregnant women (21.7% were postmenopausal, 32.3% were over 50) were histologically subdivided into several types: parabasal-cell type (I; 33/65), keratinizing-cell type (II; 24/65), parabasal and keratinizing-cell type (I-II; 5/65), pleomorphic-cell type (III; 2/65), and small-cell type (IV; 1/65). The histological type varied with age. Tumors consisting of at least a majority of cells of regular (isodiametric) appearance (Types I, I-II and IV) were seen in 60% of the group; tumors formed of isodiametric cells were characteristically found in younger pts., while older pts. showed tumors composed of irregular, often keratinizing cells. Gland involvement was seen in 72.3% of the entire group, its occurrence being similar in all cell types. Leukoplakia was associated with Types I and II tumors only (18.2% and 33.3%, resp.). The data support the hypothesis that cervix carcinoma *in situ* may develop from cells of different types.

69-1312 CARCINOMA OF THE CERVIX AMONG PROSTITUTES IN A WOMEN'S PRISON. (E.) Keighley, E. (Roy. North. Hosp., London). Brit. J. Vener. Dis. 44(3):254-255, 1968.

During 1966, cervical smears were obtained from 844 inmates of a women's prison (55/844 were under 25). This group included 190 women who admitted to prostitution, and the majority of positive smears were seen in these 190 women. Valid smears were obtained from 185/190; 19 smears (10.3%) were positive and 16/19 were confirmed by biopsy. No positive or doubtful smears were noted in the 16 women under 25 or the 2 women over 61 in this group of prostitutes. Two biopsies showed signs of imminent invasion, but no invasive carcinomas were found. The age at diagnosis was 25-30 in 7/19, 31-35 in 4/19, 36-40 in 3/19, 41-50 in 2/19 and 51-60 in 3/19. It is concluded that the risk of developing cervix cancer is apparently 1 of the major hazards of prostitution.

69-1313 DIABETES MELLITUS AND GENITAL CANCER. (Ger.) Zichel, R. (U. Gynec. Clin., Gottingen, Germany) and C. H. Schäfer. Z. Geburtsh. Gynaek. 169(2):214-221, 1968.

The over-all incidence of diabetes mellitus (DM) in women is about 1.8%, but increases to 4-7% in postmenopausal women. From 1954-1966, DM was found in 124/4095 (3.03%) women with genital cancer. The DM incidence was 3 times higher in uterus cancer (47/714 = 6.6%) than in cervix cancer (52/2418 = 2.15%); the DM incidence was also higher in vulva cancer (13/254 = 5.1%) than in pts. with ovarian tumors (7/465 = 1.5%) and other genital tumors (5/244 = 2.0%). The DM incidence increased sharply in pts. over 50; the difference in the av. ages of pts. with and without DM was only about 1.6 yr. in pts. with uterine cancer, but in the other groups the pts. with DM were an av. of 4.6-12.0 yr. older than pts. without DM. Obesity was noted in 52% of the pts. with DM (and in 62% of the pts. with DM associated with uterine cancer). No correlation between tumor site and the duration of DM was noted; DM was described as mild in 79/124, moderate in 13/124 and severe in 32/124. Only 16/124 (13%) had family histories of DM and only 15/124 (12%) showed diabetic angiopathies. The incidence of histories of gallbladder disease and infections (21/124) was regarded as significant.

69-1314 HL-A ANTIGENS AND THE CHORIOCARCINOMA. (E.) Ivašková, E. (Inst. Exp. Biol. Genet., Czech. Acad. Sci., Prague), J. Jakoubková, M. Zavadil, V. Schneid, P. Koldovský and P. Iványi. Folia Biol. (Praha) 14(5):398-401, 1968.

The presence of 5 antigens of the major human histocompatibility system (HL-A) was studied (using specific antisera) in the sera of 15 women with trophoblastic tumors (choriocarcinoma, "proliferating mole" or hydatidiform mole), their husbands, and 20 normal control women. A significant correlation was seen between the presence of the tumors and the absence of antigen 1 of the HL-A system; sera from 12/15 tumor pts. were negative, whereas sera from 11/15 of the husbands and 8/20 control women were positive for antigen 1. Another significant difference between the pts. and the control groups was seen in another study using 87-122 unclassified cytotoxic sera; sera from the husbands and the control women reacted with 52-53% of these cytotoxic sera, whereas sera from the pts. reacted with only 39% of these sera. The sera of 12/13 pts. examined showed cytotoxic antibodies against their husbands' WBC. It is suggested that the presence of HL-A alleles, with relatively few antigenic specificities (because of aberrations of the chromosomes carrying the gene(s) determining the HL-A system) is the probable condition for the occurrence of trophoblastic tumors. Under these conditions, an immune reaction to the husbands' HL-A antigens may occur in some pts., enhancing the growth and possibly causing the malignancy of the allograft. Incompatibility for antigen 1 or its alternative antigens may play a decisive role under these circumstances.

69-1315 CANCER METASTASIS TO THE CIRRHOTIC LIVER. A STUDY OF EXPERIMENTAL AND AUTOPSY MATERIAL. (E.) Berge, T. (U. Lund, Sweden) and T. Saldeen. Acta Path. Microbiol. Scand. 74(3):340-352, 1968.

In rats with skim milk- or CCl_4-induced cirrhosis, the number of liver tumors developing from Rous rat sarcoma cells inoc. into the portal vein was larger than in non-cirrhotic rats, but the presence of cirrhosis did not enhance the development of tumors from cells inoc. under the liver capsule. The association of cancer and cirrhosis was also studied in 10,160 pts. (including 865 stillborn or newborn infants) autopsied in 1958-1965 (representing 58.2% of all persons who died during this period in Malmö). Cancer was seen in 3481/10,160 subjects (34.3%); of the 3801 tumors found, 2595 (68.3%) had formed metastases. Liver cirrhosis was seen in 385/10,160 (3.8%). The incidence of extrahepatic tumors in pts. with and without cirrhosis was 93/385 (24.2%) and 3312/9775 (33.9%), resp. Several studies of the incidence of hepatic and extrahepatic metastases in pts. with and without cirrhosis, considering such factors as the site of the primary tumor (including its drainage system), the number of metastases formed, and the general tendency of the tumors to form metastases, demonstrated that liver metastases from extrahepatic tumors are no less common in the cirrhotic liver than in the non-cirrhotic liver. In fact, tumor cells that have reached the hepatic parenchyma are more likely to form metastases in the presence of cirrhosis.

69-1316 STUDIES ON HEREDITARY FACTORS RELATED TO THE DEVELOPMENT OF UTERINE CERVICAL CANCER. (E.) Koga, K. (Kyushu U., Fukuoka, Japan), K. Maeda, H. Sugimori and Y. Ishii. J. Jap. Obstet. Gynec. Soc. [Eng.] 15(3):173-176, 1968.

The cancer incidence was studied in the families of 256 pts. with cervix cancer (PF group) and the families of 240 of their husbands (HF group). Excluding these 256 pts. and their husbands, PF and HF groups included 1840 and 1747 individuals, resp. (1508 and 1432, resp., had survived beyond age 25). The PF group, the over-all cancer incidence in families, individual relatives and adult relatives (30.1%, 4.8% and 5.8%, resp.) was significantly higher than the corresponding rates in the HF group (20.4%, 3.7% and 4.4%, resp.). The cancer incidence in fathers was somewhat higher in the PF group than in the HF group (11.9% and 8.8%, resp.), because of a difference in the stomach cancer incidence (20/254 and 16/239 fathers, resp.). The cancer incidence in siblings of the PF and HF groups was approx. equal (1.5% and 1.8%, resp., in brothers; 2.7% and 2.4%, resp., in sisters); the uterine cancer incidence in the sisters was about 1.1% in both groups. The cancer incidence in mothers was significantly higher in the PF group than in the HF group (11.7% and 6.7%, resp.), because of the significant difference in the uterine cancer incidence (6.3% and 2.1%, resp.). In 16 mother-daughter pairs with uterine cancer, the av. ages at onset were 56.5 and 49.1 yr., resp. The possibility of a genetic predisposition to uterine cancer is suggested.

69-1317 ANALYSIS OF THE EFFECTIVENESS OF NOTIFICATIONS OF CASES OF MALIGNANT TUMORS BY THE HEALTH SERVICE OF THE CITY OF WARSAW. (Pol.) Gadomska, H. (Inst. Oncol., Warsaw). Przegl. Epidem. 22(3):329-332, 1968.

The Oncological Institute of Warsaw evaluated the effectiveness of registrations of new cases of malignant tumors submitted by the Health Service in Warsaw, and compared these data with certificates of deaths from malignant tumors received by the Warsaw Department of Health. Between 1962 and 1965, there was an increase of 29.4% in newly detected cases, while Warsaw's population increased only 5.8% during this period. This increase (as well as increases in crude and standardized indexes of incidence and dynamics) was statistically significant, independent of changes in the structure of Warsaw's population according to sex and age, but influenced by the greater efficiency of registration. The crude cancer incidence/100,000 population in men was 158.2 in 1962, 206.3 in 1963, 244 in 1964, 198.6 in 1965, and 216.2 in 1963-1965; in women, these rates were 231.7, 280.1, 299.1, 278.8 and 285.9, resp. The standardized incidence rates during the same period were 158.2, 192.4, 222.4, 175.8 and 196.8, resp., in men, and 231.7, 268.2, 283.4, 257.5 and 269.6, resp., in women. The incidence was higher in women than in men (probably because of easier detection in women), but the increase in the mean standardized index was higher in men (24.4%) than in women (16.4%) in 1963-1965.

69-1318 A STATISTICAL MODEL OF THE NATURAL HISTORY OF CERVICAL CARCINOMA BASED ON A PROSPECTIVE STUDY OF 557 CASES. (E.) Barron, B. A. (Rockefeller U., New York, N. Y.) and R. M. Richart. J. Nat. Cancer Inst. 41(6): 1343-1353, 1968.

The statistical model presented was based on 1-3 follow-up examinations of 557 women who had shown at least 3 cervical smears described as Class 3-Class 3C (very mild to severe) cervical dysplasia. In 10 cases, Class 3 lesions regressed to normal (Class 1) from 1 follow-up examination to another; progression of Class 3 dysplasia to carcinoma in situ was seen in 18/557 at the first follow-up examination and 10/221 at the second examination (performed only in women with Class 3 lesions at the previous examination). The data suggested that spontaneous reversion of an established dysplastic lesion is rare. The probability of a Class 3 lesion remaining in Class 3 at the first, second and third follow-up examinations was 0.784, 0.815 and 0.787, resp. The proposed model was based on the assumptions that (a) the probabilities that any given lesion will become unstable and progress to another state are constant over time, and (b) that the behavior of the lesion in any time interval is independent of its behavior during the preceding observation period.

69-1319 ORIGIN AND DEVELOPMENT OF CARCINOMA IN THE PROSTATE. (E.) McNeal, J. E. (Herrick Mem. Hosp., Berkeley, Calif.). Cancer 23(1):24-34, 1969.

The natural history of prostate carcinoma was studied in 1 surgical and 133 autopsy specimens, including 45 prostates with carcinomas (multiple tumors were present in 12/45) from men over 40. None of the carcinomas developed entirely in the central zone and only 5/45 invaded the boundary between the central and peripheral zones; the centers of 66% of the tumors were within 3.3 mm of the capsule. The results of a study of the decline of glandular activity with age (in 35 prostates with and 54 without carcinoma) showed that carcinomas arose selectively in active (rather than atrophic) glandular tissue, accompanied by distinctive premalignant changes. Results of a study of tumor vol. distribution suggested a single species of carcinoma, with a slow growth rate and with a logarithmic growth curve (rather than 2 species with different biological potential). The progression of the tumor was predictable, with early involvement of the capsule and perineural spaces. The later stages were characterized by loss of differentiation (suggesting a gradual increase in malignant potential, closely linked to tumor size) and ability to penetrate the capsule and periurethral stroma. Penetration of the capsule may be the most important factor predisposing to the development of distant metastases.

69-1320 AN EVALUATION OF ERYTHROPOIESIS IN THE YOUNG RAT. (E.) Roylance, P. J. (Inst. Cancer Res., Sutton, England). Cell Tissue Kinet. 1(4):299-308, 1968.

Bone marrow erythropoiesis was studied in male rats (about 6 wk. old; 100-115 g), F_1 hybrids of the Augus and Marshall strains; the rats were treated with ^3H-thymidine to label mitotic cells, and the results were analyzed by computer. In the combined population of proerythroblasts and basophilic erythroblasts, the median cell cycle time was 8.8 hr.; median durations of the G_1, S and G_2 phases were 1.8, 4.9 and 1.4 hr., resp. The median cell cycle time for the polychromatic erythroblasts was 9.3 hr.; median durations of the G_1, S and G_2 phases were 2.3, 5.0 and 1.7 hr., resp. The 1-hr. labeling index was: proerythroblasts 70%, basophilic erythroblasts 60%, and polychromatic erythroblasts 30%.

The cell cycle times for these proliferating cells were in close agreement with values previously reported for mouse erythropoietic cells, but shorter than those reported for rat cells; it is suggested that the duration of the cell cycle in erythropoietic cells increases with age.

69-1321 ACTIVITY OF THE FERRARA GYNECOLOGICAL TUMOR PREVENTION CENTER DURING THE FIVE-YEAR PERIOD 1963-1967. (It.) Tortora, M. (U. Ferrara, Italy). *Arch. Ostet. Ginec.* 73(1): 1-14, 1968.

From October 1962-September, 1967, 50,115 women underwent 1-5 cytological examinations at this center, of whom 48,263 (32.5% of the female population over 20 yr. old) resided in the province of Ferrara. Invasive cervix cancer was detected in 144 women (Stage I in 46, Stage Ib in 67, Stage II in 24, Stage III in 2, Stage IV in 1), cancer of the uterus (Stage I) in 4, carcinoma *in situ* in 184 and dysplasia in 168. Radiological breast examinations were performed in 6832 women, showing breast cancer in 24 pts. (3.51%; 8/24 tumors were not palpable).

69-1322 STATISTICAL DATA ON TUMORS IN THE PROVINCE OF SALERNO FOR THE FOUR-YEAR PERIOD 1963-1966. (It.) Napoli, A. (S. Giovanni di Dio e Ruggi d'Aragona Hosp., Salerno, Italy) and E. Giani. *Rass. Int. Clin. Ter.* 48(17): 1071-1083, 1968.

From 1963-1966, in the province of Salerno, 1536 persons died of cancer, for a mean mortality rate for all malignant tumors of 42.12/100,000 persons (45.83 in 1963; 44.28 in 1964; 43.63 in 1965; 34.74 in 1966). The incidence/100,000 was 28.10 for people living in the plains, 27.10 in the inland mountains, 45.46 in the inland hills, and 55.28 in the hills along the seacoast. The most frequent cancer sites were the lung (5.97/100,000), stomach (4.98), liver and biliary tract (4.79), uterus (3.26) and breast (2.80). The incidence of these cancers was lowest among the inhabitants of the inland mountains and highest in those living along the inland and seacoast hills, where most of the industries are situated. The highest malignant tumor frequency was observed in the 60-70 yr. age groups and in males (male:female ratio approx. 2:1). A surprisingly high incidence of liver and biliary cancer was observed. Lung tumors were most frequent in men and in the 60-70 yr. age group. Stomach cancer was much more frequent in men than in women up to the age of 70-80 yr., when the sex difference became less apparent. Cancer of the breast and uterus was most frequent in the 50-60 yr. age group. Other relatively frequent cancer sites mentioned were the brain (51 cases), small intestine (49 cases), large intestine (40 cases), bladder (72 cases), prostate (63 cases), larynx (61 cases), bone (76 cases) and leukemia (74 cases).

See also abstract nos.: 1152,1156,1163,1176,1208,1219,1223,1224,1279

69-1323 CANCER AND HEREDITY: IMPLICATIONS FOR EARLY CANCER DETECTION. (E.) Lynch, H. T. (Creighton U. Sch. Med., Omaha, Neb.). GP 38(6):78-88, 1968.

Some instances of genetically determined malignant diseases from the author's pt. group are presented. In 1 family with xeroderma pigmentosum affecting 5/7 siblings, malignant melanoma developed in 2/5 affected siblings. The "cancer family" syndrome, including an increased incidence of adenocarcinoma (especially of the colon, rectum and endometrium) and multiple primary tumors, relatively early age of onset, and apparently autosomal dominant inheritance, is presented in tabular form for 1 of the author's 6 investigated families. In such families, the cancer risk is about 50%. The multiple nevoid basal cell carcinoma syndrome and (in about 3% of cases) cutaneous malignant melanoma are described as autosomal dominant disorders (1 case of each tumor type is described briefly). Neurofibromatosis (autosomal dominant) has a cancer risk of about 5-8%. The breast cancer risk is increased about 3-fold (from 5% to 15%) in first-degree female relatives of pts. with this tumor.

69-1324 BASAL CELL NEVOMATOSIS ASSOCIATED WITH A CONGENITAL RHABDOMYOSARCOMA. (Fr.) Schweisguth, O. (Gustave-Roussy Inst., Villejuif, France), R. Gerard-Marchant and J. Lemerle. Arch. Franc. Pediat. 25(9):1083-1093, 1968.

An 8-yr.-old boy with the typical musculoskeletal and cutaneous signs of the nevoid basal cell carcinoma syndrome and a positive family history of the disease (his father, paternal grandfather and 1 brother were affected to a lesser degree) is presented. This pt. was unusual in that the typical skin tumors had appeared at the age of 3 yr. A congenital rhabdomyosarcoma of very slow growth rate was also present. This tumor (of the substernal area) had been removed at the age of 9 mo. and the pt. had received radiotherapy (4300 rads), remaining recurrence-free until a submaxillary tumor of the same histological type developed suddenly at 8 yr. of age. This is believed to be the first reported case of the nevoid basal cell carcinoma syndrome associated with a malignant connective tissue tumor.

69-1325 LINKAGE ANALYSIS OF THE NEVOID BASAL CELL CARCINOMA SYNDROME. (E.) Anderson, D. E. (U. Texas M.D. Anderson Hosp., Houston). Ann. Hum. Genet. 32(Pt.2):113-123, 1968.

Linkages between the gene locus for the nevoid basal cell carcinoma syndrome and the loci for the ABO, MNS, Rh, P, Kell, Lewis, Duffy and Kidd blood groups were studied in 12 unrelated kindreds (11 others were not evaluable for various reasons, including sporadic cases of the syndrome in 7/11). Linkage with a recombination fraction of less than 0.1 was unlikely for any marker locus. The most favorable of the possible loose linkages was that between the syndrome locus and the Rh locus; considering the prior odds against the presence of 2 autosomal loci on the same chromosome, the probability of linkage was 12%. With the other marker loci, av. probabilities of linkage were about 3%.

69-1326 MYCOSIS FUNGOIDES IN SISTER AND BROTHER. (Heb.) Sandbank, M. (Tel Aviv U. Med. Sch., Israel) and I. Katzenellenbogen. Harefuah 75(5):187-191, 217, 1968.

A sister and brother with the 2 cutaneous stages of mycosis fungoides lasting 39 and 18 yr., resp., are described (the terminal leukemic stage lasted 3 wk. in the sister). Neither pt. showed visceral involvement clinically or at autopsy.

69-1327 MYCOSIS FUNGOIDES OF PROLONGED DURATION IN SIBLINGS. (E.) Sandbank, M. and I. Katzenellenbogen (Beilinson Hosp., Petah Tikva, Israel). Arch. Derm. (Chicago) 98(6):620-627, 1968.

See the preceding abstract.

69-1328 HEPATORENAL GLYCOGENOSIS (TYPE I GLYCOGENOSIS) AND CARCINOMA OF THE LIVER. (E.) Zangeneh, F. (U. Washington, Seattle), G. A. Limbeck, B. I. Brown, J. R. Emch, M. M. Arcasoy, V. E. Goldenberg and V. C. Kelley. J. Pediat. 74(1):73-83, 1969.

Two brothers (12 and 14 yr. old) with Type I hepatorenal glycogen storage disease (including hyperuricemia and tophaceous gout) are described. The older brother died of a rapidly progressive adenocarcinoma of the liver (this is the second such case reported). Clinical, histochemical and electron microscopic examination of specimens from this pt. showed less glycogen in the hepatoma than in the liver (although the molecular structure of the glycogen was normal in both tissues), an absence of glucose-6-phosphatase (with a corresponding lack of smooth endoplasmic reticulum), and low acid phosphatase activity (with correspondingly few lysosomes). This pt. had showed apparently benign adenomatous nodules in a liver biopsy 5 yr. before death, and an abnormal liver scan 2 yr. before death. His younger brother showed clinical symptoms and an abnormal liver scan at the time of report, suggesting the possibility of hepatoma. It is suggested that a metabolic aberration in Type I glycogen storage disease may be responsible for a hepatocarcinogenic effect, although such changes may require a long time. If this is true, more cases of Type I glycogen storage disease with hepatoma might be expected, as more children with glycogen storage disease are successfully controlled in the early stages.

69-1329 SOFT TISSUE SARCOMAS IN CHILDREN ASSOCIATED WITH CONGENITAL ANOMALIES.

(E.) Sloane, J. A. (U. Texas Med. Br., Galveston) and M. M. Hubbell. Cancer 23(1):175-182, 1969.

From 1940-1965, 12 boys and 8 girls (age 14 mo.-15 yr.) with malignant soft tissue tumors (developing outside the parenchymal organs) were seen. A wide variety of congenital anomalies was also noted in 8/20 with rhabdomyosarcoma (4/10), pleural mesothelioma (1/2; the other tumor of this type was clinically and histologically benign), fibrosarcoma (1/3), liposarcoma (1/1), and an unclassified pleomorphic sarcoma (1/1); the other tumor types included 1 case each of myxoma, leiomyosarcoma and alveolar soft part sarcoma. Single congenital defects were seen in 4 boys (strabismus with or without blindness in 2/4, hemangioma and convulsions in 1/4 each). Multiple congenital defects were seen in 1 boy (a Negro, with mental retardation, hemangioma and skin hyperpigmentation) and 3 girls (cretinism, absence of 1 auricle and auditory canal, and weak extraocular muscles in 1/3; mental retardation, hydrocephalus and ovarian cysts, with no histological signs of Hurler's syndrome, in 1/3; progeria or a closely related syndrome in 1/3). Family histories of cancer were noted for 2/3 girls with multiple defects. A wide variety of congenital anomalies was also noted in a high proportion of 37 children with benign soft tissue lesions. No congenital mesenchymal tumors were seen in this series. The possibility of a similar or related basis for the development of congenital anomalies and soft tissue neoplasms is suggested.

69-1330 HYPOTHALAMOPITUITARY HYPERACTIVITY AND ENDOMETRIAL CARCINOMA. QUALITATIVE AND QUANTITATIVE DISTURBANCES IN HORMONE PRODUCTION.

(E.) Dilman, V. M. (68 Leningradskaya St., Pesochny-2, Leningrad, USSR), L. M. Berstein, Y. F. Bobrov, Y. V. Bohman, I. G. Kovaleva and N. V. Krylova. Amer. J. Obstet. Gynec. 102(6): 880-889, 1968.

Hormone excretion patterns were studied in several experiments in menopausal pts. with endometrial carcinoma and in normal menopausal women of the same av. ages. Total phenolic steroid (PS) excretion and the number of PS excreted (determined by thin-layer chromatography) increased significantly in the cancer pts., while the level of classical estrogen (E) excretion remained within the normal range; the ratio of total PS:E was 8.0 in the cancer pts. and 5.3 in menopausal controls (compared to 3.0 in normal young menstruating women). Total gonadotropin excretion was decreased in the cancer pts., but FSH and LH excretion was often increased. Serum free fatty acids and cholesterol were also significantly increased in a high proportion of the cancer pts., which might explain the high frequency of diabetes mellitus and hypercholesterolemia in pts. with endometrial cancer. These data (together with other data on the association of endometrial cancer, obesity, diabetes mellitus, hypertension, and other signs) suggested that endometrial cancer is connected with hyperfunction of the pituitary-hypothalamic axis.

69-1331 BRONCHIAL CARCINOMA WITH HYPERTROPHIC PULMONARY OSTEOARTHROPATHY. (E.)

Le Roux, B. T. (Wentworth Hosp., Durban, South Africa). S. Afr. Med. J. 42(40):1074-1075, 1968.

Hypertrophic pulmonary osteoarthropathy (HPO) was noted in 49/4000 pts. (1.2%) with bronchial carcinoma seen between 1949 and 1963. Only 1 of the pts. with HPO (48 men, 1 woman) was a non-smoker. Peripheral tumors were present in 69% of the pts. with HPO, compared to an incidence of 42% in the entire group. The histological diagnosis was adenocarcinoma in 5% of the entire group, but nearly 20% of the tumors associated with HPO were adenocarcinomas. The tumor operability rate was higher in the pts. with HPO (69%) than in the pts. without HPO (36.6%), but the long-term survival rate was lower in the HPO group. Resection of the tumor relieved the symptoms of HPO in all cases. Symptoms of HPO did not recur in the 20/49 pts. who died of extrathoracic metastases, but recurrent HPO was noted in 2/4 dying of intrathoracic metastases. In the large number of pts. without HPO who later developed local tumor recurrences or metastases, no symptoms of HPO were seen when the recurrences or metastases developed.

69-1332 CANCER RISK IN INTRADUCTAL PAPILLOMA AND PAPILLOMATOSIS.

(E.) Buhl-Jørgensen, S. E. (Finsen Inst., Copenhagen), K. Fischermann, H. Johansen and B. Petersen. Surg. Gynec. Obstet. 127(6):1307-1312, 1968.

From 1950-1959, 180 pts. were treated surgically (biopsy, resection or simple mastectomy) for intraductal papilloma (53 women) or papillomatosis (81 women, 3 men) of the breast. Cancer of the same breast was detected at the time of treatment in 19/53 (26%) with papilloma and in 27/84 (24%; all were women) with papillomatosis; 84% and 89% of these breast tumors, resp., were intraductal carcinomas. The women without concurrent breast cancer were followed up for 6-16 yr. In pts. treated primarily by biopsy or resection, the incidence of cancer in the ipsilateral or contralateral breast was 14% in the pts. with papilloma and 5.7% in the pts. with papillomatosis. Most cancers of the ipsilateral breast were intraductal carcinomas, and tended to develop in the immediate vicinity of the surgical scar. By comparison, the expected annual incidence rate/100,000 of breast cancer in women living in the Greater Copenhagen area in 1953-1957 was 1.27% during this follow-up period (calculated as 12.2 yr.).

69-1333 MIBELLI'S ZONIFORM POROKERATOSIS WITH DEGENERATION: 2 CASES. (Fr.) Bazex, A. (Purpan Hosp., Toulouse, France) and A. Dupré. Ann. Derm. Syph. (Paris) 95(4):361-374, 1968.

A man and a woman (age 67 and 60 yr., resp.) with porokeratosis and areas of both premalignancy and malignant transformation (into spinocellular and basal cell carcinoma, resp.) are described. In both pts., the porokeratosis had appeared in childhood; shortly after an attack of measles in the man, who had generalized porokeratosis with hyperpigmentation. In the woman (who worked on a farm), the lesions were confined to the left calf, thigh, forearm and hand, and were much less prominent in the winter than in the summer; some of the lesions in this pt. showed changes resembling bullous lichen planus. It is suggested that Mibelli's porokeratosis should be included among the preneoplastic dermatoses.

69-1334 PRIMARY ADENOCARCINOMA IN A CYSTIC DUCT STUMP. REPORT OF A CASE AND REVIEW OF THE LITERATURE. (E.) Phillips, S. J. (Maimonides Med. Ctr., Brooklyn, N. Y.) and J. Estrin. Arch. Surg. (Chicago) 98(2):225-227, 1969.

A 57-yr.-old man with an adenocarcinoma of the cystic duct stump, developing 6 yr. after cholecystectomy for benign cholelithiasis, is presented. No stones were found at surgery; whether the passage of a stone prior to operation was a predisposing factor could not be determined. This is the first reported case of primary adenocarcinoma in a cystic duct stump, but 287 cases of carcinoma of the cystic duct stump have been reported (however, data sufficient to identify these tumors as primary cystic duct carcinomas were found for less than 25% of these cases). The predominant predisposing factor in the authors' case was the presence of a remnant of the cystic duct.

69-1335 ESOPHAGEAL DIVERTICULI AND CANCER. (Fr.) Piaget, F., R. Charachon, J. C. Gros, C. J. La Villauroy and M. Dezani. J. Franc. Otorhinolaryng. 17(9):751-754, 1968.

Three men with esophageal diverticuli transforming to carcinoma are described. In 2/3, the diverticuli were noted by barium radiography 12-13 yr. before the tumors appeared; the other pt. (a miner in a slate quarry) had a diverticulum of approx. 2 yr. duration before cancer was identified. The contradictory statements regarding the risk of malignant transformation of esophageal diverticuli are reviewed, including 1 suggestion that the risk of transformation is higher when the diverticuli are in the lower portion of the esophagus.

69-1336 BLOOD DISEASES AND COLLAGEN DISEASES. V. POSSIBLE PATHOGENIC RELATIONSHIP BETWEEN THE COLLAGEN DISEASES AND THE LEUKEMIAS. (Rus.) Dul'tsin, M. S. (Inst. Rheum., Acad. Med. Sci. USSR, Moscow) and Ia. A. Sigidin. Probl. Gemat. 13(10):23-29, 1968.

Of 70 pts. with arthritis seen in the authors' clinic, 2/70 developed acute leukemia (hemocytoblastic in 1/2, unspecified type in 1/2). One man developed leukemia 22 mo. after the diagnosis of arthritis, and died 5 mo. later. The other man had a longer history of arthritis (about 13 yr.) at the time of his death from leukemia. Anti-inflammatory therapy, admin. prior to the diagnosis of leukemia, included salicylates and prednisolone in 2/2; 1/2 also received a phenylbutazone-aminopyrine mixture (Reopyrine), and 1/2 was treated with penicillin and 5-(hydroxymethyl)-6-methyluracil (Pentoxyl; to stimulate leukopoiesis). The following mechanism is postulated for the progression from rheumatic disease to leukemia: sensitization by exogenous antigens; increased proliferation and mutation of lymphoid cells; formation of cell clones with autoimmune potential; autoimmune reactions to the connective tissue; enhancement of the replication of cells with autoimmune capabilities, accompanied by an increase in mutations; and, finally, the appearance of neoplastic lymphoid cells.

69-1337 ELECTRON MICROSCOPIC OBSERVATION ON HUMAN LUNG CANCER. (Jap.) Genka, K. (Kyoto U., Japan). Bull. Chest Dis. Res. Inst. Kyoto U. 1(1-2):200-238 & 45, 1968.

The possibilities of carcinogenesis in the alveolar area are discussed, on the basis of electron microscopic findings in surgical specimens from 57 pts. with lung cancer. The tumor cells, particularly those of the less differentiated tumors, were more irregular in form than the normal bronchoalveolar epithelial cells. Cytoplasmic organelles were better developed in cells from adenocarcinomas than in cells from epidermoid or undifferentiated carcinomas. The Type B epithelial cell (alveolar wall cell) seemed to have such a high potentiality as to play an important role as the reserve cell in the alveolar area. It is suggested that the Type B cell can be transformed to a tumor cell in response to certain carcinogenic stimuli.

69-1338 RECENT PROGRESS IN THE INTERPRETATION OF MALIGNANCY ASSOCIATED CHANGES (MAC). (E.) Nieburgs, H. E. (Mt. Sinai Sch. Med., City U. New York, N. Y.). Acta Cytol. (Balt.) 12(6):445-453, 1968.

Malignancy associated changes (MAC) were studied in sections of benign or atypical dysplasia, carcinoma in situ and infiltrating carcinoma of the cervix, and in specimens of malignant or normal tissue from pts. with other types of infiltrating cancer, under conditions permitting a total enlargement of 20,000. Examination of cells from atypical dysplasia and carcinoma during anaphase and telophase showed the same nuclear structures as those found in cells showing MAC. Non-dividing cells from tissues with atypical dysplasia showed this nuclear change as a postmitotic phenomenon. The MAC apparently arose from a persistent nuclear telophase structure in mature cells.

69-1339 INFLUENCE OF POPULATION DENSITY ON MORTALITY IN MICE BEARING TRANSPLANTED TUMORS. (Fr.) Dechambre, R.-P. (Gustave-Roussy Inst., Villejuif/Seine, France) and C. Gosse. C.R. Acad. Sci. [D] (Paris) 267(25):2200-2202, 1968.

In virgin female mice (strain C57BL/6) bearing s.c. inoc. B-16 melanoma or i.p. inoc. ascites Krebs-II carcinoma, the mean survival times in mice caged alone were 33.1 and 21.2 days, resp., compared to 27.1 and 17.5 days, resp., in mice caged in groups of 10. Preliminary results of another study suggested that these highly significant differences in survival time resulted from the presence or absence of endocrine disturbances caused by the stress of crowding.

69-1340 CHROMOSOMES OF A HUMAN NEUROBLASTOMA: A NEW CASE WITH ACCESSORY MINUTE CHROMOSOMES. (E.) Levan, A. (Inst. Genetics, Lund, Sweden), G. Manolov and P. Clifford. J. Nat. Cancer Inst. 41(6):1377-1387, 1968.

Cells from a neuroblastoma obtained from a male infant showed a stemline karyotype of 46 chromosomes of normal size, in addition to a varying number of minute chromosomes (0-58/cell, av. 7.9/cell). Most of the normal chromosomes conformed to the normal human karyotype, except for 1 member of pair #2 (with a lengthier long arm than normal), a small extra chromosome in Group C, and a missing chromosome in Group D (the extra chromosome in Group C was thought to represent the missing Group D chromosome). Other chromosomes of Group D showed unusually large short arms. The minute chromosomes were evidently centric, but their mitotic behavior was irregular; 24/250 cells examined showed 1 or more micronuclei (probably containing minute chromosomes). These minute chromosomes were similar in some ways to the naturally occurring accessory chromosomes (B chromosomes) seen in a wide variety of plant and animal tissues.

69-1341 CYTOGENIC STUDIES IN LEUKAEMIA AND ALLIED DISORDERS IN WESTERN AUSTRALIA DURING THE PERIOD 1963/1965. (E.) Onesti, P. (Roy. Perth Hosp., Australia) and H. J. Woodliff. Med. J. Aust. 2(26):1176-1182, 1968.

Results of a 3-yr. survey of chromosomal morphology in peripheral blood cultures and direct bone marrow preparations from 129 pts. with leukemia and allied diseases are summarized (some of the results have been published previously). Most preparations from normal subjects showed some degree of aneuploidy; mean levels of aneuploidy in blood and bone marrow cells were 5% and 9.6%, resp. (range, 0-18% and 0-20%, resp.), for a combined mean value of 5.7%. The mean level of aneuploidy in blood and bone marrow cells (combined) was significantly increased in all diseases studied: 27.7% in acute leukemia (19 pts.), 21.9% in chronic granulocytic leukemia (CGL; 28 pts.), 18.1% in chronic lymphocytic leukemia (23 pts.), 10.3% in macroglobulinemia (7 pts.), 13.7% in multiple myeloma (7 pts.), 11.1% in lymphoma (14 pts.), 9.4% in myelofibrosis (9 pts.), and 15.6% in polycythemia vera (20 pts.). All pts. with CGL and 1/2 pts. with megakaryocytic myelosis showed the Ph^1 chromosome, which was the only consistent chromosomal abnormality noted. Abnormal cell lines of different types were seen in 2/19 with acute leukemia, 2/28 with CGL and 1/2 with megakaryocytic myelosis.

69-1342 RELATIVE INABILITY TO INDUCE TOLERANCE IN ADULT NZB AND NZB/NZW F_1 MICE. (E.) Staples, P. J. (NIH, Bethesda, Md.) and N. Talal. J. Exp. Med. 129(1):123-139, 1969.

Immune tolerance to ultracentrifuged bovine γ-globulin could not be elicited in 6-wk.-old mice of strain NZB or in the F_1 hybrids of NZB and NZW mice (designated B/W strain), but tolerance developed readily in C3H, NZW and C57Bl mice. Ultracentrifuged human γ-globulin did not elicit tolerance in NZB, B/W or Balb/c mice. NZB and B/W mice showed higher antibody titers to a standard antigenic challenge. The possible relationships between this immunologic hyperreactivity and lack of experimental tolerance (seen in the NZB, B/W and Balb/c mice) and their genetic predispositions to autoimmune disorders (NZB and B/W mice) and malignant lymphoma or plasmacytoma (NZB and Balb/c mice) are discussed.

69-1343 BRONCHOGENIC CARCINOMA IN THREE BROTHERS. (Ger.) Nagy, I. (Gen. Hosp., Sombor, Yugoslavia). Prax. Pneumol. 22(11):718-723, 1968.

Squamous cell carcinoma of the bronchus (non-epidermoid type in 2 pts.) was diagnosed almost simultaneously in 3 brothers (age 56-66 yr.); all had been heavy smokers for many yr., and 2/3 (the oldest and the youngest) had 2-yr. histories of unidentified respiratory diseases. Two sisters of these 3 pts. had died of cancer (genital in 1/2, breast in 1/2). No signs of cancer were noted in 2 other adult sisters, or in the parents, grandparents, cousins or adult offspring of these 5 affected siblings. The possibility of an interaction of 3 factors (smoking, heredity, and an unidentified factor indicated by the simultaneous onset of respiratory symptoms in 2/3 brothers) is discussed.

69-1344 COINCIDENTAL PRIMARY SARCOMA AND CARCINOMA OF THE CERVIX. (E.) Paley, W. B. (North Shore Hosp., Manhasset, N. Y.), G. J. Phaneuf and S. C. Sommers. Obstet. Gynec. 33(1):41-47, 1969.

69-1345 IMPORTANCE OF SEX CHROMATIN CONTENT IN TUMOR CELLS FOR THE HORMONAL TREATMENT OF MAMMARY CANCER. (Rus.) Bavli, Ia. L. (Petrov Res. Inst. Oncol., Leningrad, USSR) and E. L. Neishtadt. Vop. Onkol. 14(12):7-11, 1968. 13 References

69-1346 PROPERTIES OF THE RAT TUMOUR FEDEX-WP DURING LONG-TERM CULTIVATION IN VITRO. (E.) Křenová, D. (Charles U., Prague), V. Křen and O. Štark. Neoplasma (Bratisl.) 15(4):379-392, 1968.

69-1347 SOME MORPHOLOGICAL OBSERVATIONS ON THE LEUCOCYTES OF IMMATURE LEUKAEMIAS IN SHORT-TERM IN VITRO CULTURE. (E.) Pössnerová, V. (Charles U., Prague) and F. Heřmanský. Neoplasma (Bratisl.) 15(4):365-378, 1968.

69-1348 DUPLICATION OF THE Y CHROMOSOME DURING MYELOBLASTIC CRISIS OF CHRONIC MYELOCYTIC LEUKEMIA. (E.) Anderson, J. W. (Butterworth Hosp., Grand Rapids, Mich.), G. Pearson, A. Valdmanis and J. D. Mann. Ann. Genet. (Paris) 11(3):135-137, 1968.

69-1349 BRIEF REPORT: A CYTOGENETIC STUDY OF ACUTE ERYTHROLEUKEMIA IN CHILDREN. (E.) Dyment, P. G. (U. South. Calif. Sch. Med., Los Angeles), J. Melnyk and C. A. Brubaker. Blood 32(6):997-1002, 1968.

AUTHOR INDEX

Abbes, M. 1288
Adachi, K. 1191
Aisenberg, A. 1297
Al-Awqati, Q. S. 1295
Al-Damluji, S. F. 1295
Alexander, J. W. 1289
Altemeier, W. A. 1289
Anderson, D. E. 1325
Anderson, J. W. 1348
Andrews, J. L. 1269
Arcasoy, M. M. 1328
Archer, P. G. 1163
Armijo, M. 1175
Armynot Du Chatelet, M.-F. 1249
Auerbach, O. 1212,1213
Auriol, M. 1290
Ayre, J. E. 1310
Ayres, J. C. 1228
Ayres, J. L. 1226,1227

Bailey, C. 1239
Bakay, B. 1237,1238
Barron, B. A. 1318
Basset, F. 1203,1204
Bates, F. 1229
Bavli, Ia. L. 1345
Bazex, A. 1333
Bedoya, V. 1247
Bentvelzen, P. 1232
Berenblum, I. 1137
Berge, T. 1315
Bergolz, V. M. 1267
Berstein, L. M. 1330
Birath, G. 1161
Bischoff, F. 1140
Black, P. H. 1128
Blair, C. D. 1257
Blank, F. 1198
Blumenschein, G. R. 1275
Bobrov, Y. F. 1330
Bock, F. G. 1197,1209
Boger, E. 1144
Bohman, Y. V. 1330
Boothe, A. D. 1274
Bourali, C. 1250
Boutwell, R. K. 1195
Bowman, R. W. 1172
Boyden, R. 1259
Boyland, E. 1141
Božek, J. 1285
Brandt, P. 1259
Briggs, L. 1277
Brocheriou, C. 1290
Brodsky, I. 1255,1256
Brookes, P. 1240
Brown, B. I. 1328
Browning, D. 1294
Brubaker, C. A. 1349
Bryson, G. 1140
Bubeník, J. 1264
Buhl-Jørgensen, S. E. 1332
Bullerman, L. B. 1228
Burkitt, D. P. 1156
Burmester, B. R. 1262
Butler, W. H. 1149

Cachin, Y. 1307
Cahan, W. G. 1215
Calvet, J. 1135
Campbell, C. B. 1206
Carrata Thomas, A. 1162
Casey, H. W. 1172
Castilla-Pertiñez, R. 1174
Chabot, J. 1204
Charachon, R. 1335
Chi, C. H. 1171
Chin, O. 1198
Choi, N. W. 1308
Chojnowski, J. R. 1217
Chomette, G. 1290
Chopra, H. C. 1276
Christensen, C. M. 1183,1229
Chýle, P. 1264
Clark, C. D. 1272
Clifford, P. 1340
Cole, P. 1297
Coll, J. 1135
Colomb, D. 1164
Coppey, J. 1250
Correa, P. 1303
Cousineau, G. 1234
Cuello, C. 1303
Cutts, J. H. 1188

Dahlin, D. C. 1165
Dao, T. L. 1139
Daoust, R. 1234
David, D. 1164
Dechambre, R.-P. 1339
De Dulanto, F. 1174,1175
Della Porta, G. 1130
Dementieva, V. V. 1267
De Padova, A. 1259
Desbordes, J. 1134,1205
De Scoville, A. 1296
Dezani, M. 1335
Diamandopoulos, G. Th. 1283
Dickinson, B. M. 1269
Dilman, V. M. 1330
Di Stefano, H. S. 1263
Dixon, F. J., Jr. 1158
Doll, R. 1207
Donner, L. 1264
Dorn, C. R. 1292,1293
Dougherty, R. M. 1263
Dousset, G. 1134,1205
Dreesman, G. R. 1282
Duesberg, P. H. 1257
Duke, G. A. 1221
Dul'tsin, M. S. 1336
Dungworth, D. L. 1271
Dunham, L. J. 1133
Dunne, H. W. 1272
Dupré, A. 1333
Dutcher, R. M. 1266
Duwoos, H. 1205
Dyment, P. G. 1349
Dziak, A. 1177

Eckardt, R. E. 1157
Eisenberg, H. 1303
Emch, J. R. 1328
Enders, J. F. 1283
Ernoult, J. L. 1205
Esfahani, M. 1231
Estrin, J. 1334
Evans, I. A. 1147

Fabisch, P. 1280
Feller, W. F. 1276,1278
Ferrari-Sacco, A. 1162
Fink, M. A. 1261,1278
Fischermann, K. 1332
Fjelde, A. 1197
Fonts, E. A. 1216
Fox, H. W. 1197
Franker, C. K. 1253
Frasca, J. M. 1212,1213
Frei, J. V. 1194
Fromme, H.-G. 1185
Frommes, S. P. 1269
Froude, G. C. 1188
Fullmer, C. D. 1214

Gadomska, H. 1317
Genka, K. 1337
Gerard-Marchant, R. 1307, 1324
Giani, E. 1322
Gilly, G. 1298
Gilly, L. 1298
Glover, E. L. 1196
Goetz, I. E. 1230
Goldenberg, V. E. 1328
Good, R. A. 1186
Grace, J. T., Jr. 1254
Greenlaw, R. H. 1216
Gresser, I. 1250
Griel, L. C. 1272
Gros, J. C. 1335
Gross, L. 1251
Gross, S. 1294
Grosse, C. 1339

Haddow, A. J. 1287
Hadjiolov, D. 1236
Halonen, M. 1182
Hamilton, H. B. 1163
Harper, P. V. 1179
Harvey, R. G. 1182
Hecker, E. 1199
Heege, E.-M. 1185
Heidelberger, C. 1240
Henry, M. 1249
Heřmanský, F. 1347

Hill, I. D. 1207
Hoffmann, D. 1132
Hollander, C. F. 1232
Holmes, S. 1207
Homburger, F. 1144
Hongo, T. 1169
Hubbell, M. M. 1329
Hugoson, G. 1284
Hulse, E. V. 1173

Igarasi, S. 1230
Imamura, M. 1281
Ioachim, H. L. 1258
Ishii, Y. 1316
Ishiko, T. 1230
Isojima, S. 1244
Ito, Y. 1260
Iványi, P. 1314
Ivašková, E. 1314
Ivins, J. C. 1165

Jakoubková, J. 1314
Jamieson, J. D. 1212,1213
Jänisch, W. A. 1241,1242,1243
Johansen, H. 1332
Johns, L. W. 1252
Johnson, K. G. 1163,1176
Jung, H.-D. 1306
Just, G. 1198

Kahn, S. B. 1255,1256
Katzenellenbogen, I. 1326
Keighley, E. 1312
Kelley, V. C. 1328
King, G. S. 1261
Kingsley, W. F. 1194
Kinosita, R. 1230
Kirman, D. 1215
Kirschstein, R. L. 1248
Klauber, M. R. 1292
Klein, E. 1197
Kmetz, M. E. 1272
Knox, J. F. 1207
Koga, K. 1316
Koldovský, P. 1264,1314
Kölzsch, J. 1306
Kovaleva, I. G. 1330
Křen, V. 1346
Křenová, D. 1346
Krylova, N. V. 1330
Kuhlmann, W. 1185
Kunkel, H. G. 1158
Kurita, Y. 1260
Kurpios, J. 1285

Lagerlöf, B. 1170,1171
Lancaster, M. C. 1225
Lange, R. D. 1254
Laqueur, G. L. 1146
Lausch, R. N. 1282
La Villauroy, C. J. 1335
Law, L. W. 1151

Lee, D. J. 1226,1227
Lemerle, J. 1324
Leong, J. L. 1187
Le Roux, B. T. 1331
Levan, A. 1340
Levine, M. K. 1304
Libánský, J. 1264
Likhachev, A. Ia. 1160
Limbeck, G. A. 1328
Luis, O. H. 1293
Lynch, H. T. 1323

MacKay, E. N. 1300
MacMahon, B. 1297
Maeda, K. 1316
Maier, Ɨ. 1166
Malasková, V. 1264
Malmquist, W. A. 1274
Mamuro, T. 1178
Mann, J. D. 1348
Manolov, G. 1340
Manouvrier, R. 1205
Mantel, N. 1127
Martin Gomez, A. 1175
Martinson, F. D. 1301
Matsunami, T. 1178
McNeal, J. E. 1319
Melnyk, J. 1349
Meranze, D. R. 1198
Meyer, P. B. 1202
Micheau, C. 1307
Mihailovich, N. 1193
Miki, Y. 1305
Miller, E. C. 1142
Miller, J. A. 1142
Mirand, E. A. 1254
Mirocha, C. J. 1183,1229
Mizell, M. 1261
Modan, B. 1286
Mole, R. H. 1173
Moloney, J. B. 1275
Montagna, W. 1191
Montesano, R. 1220
Mortimer, R. H. 1206
Morton, J. F. 1223
Muñoz, N. 1247

Nagy, I. 1343
Namer, M. 1288
Napoli, A. 1322
Nasiell, M. 1210
Neishtadt, E. L. 1345
Nelson, G. H. 1183,1229
Neriishi, S. 1163
Newberne, P. M. 1149,1233,1239
Nieburgs, H. E. 1338
Nishimura, R. 1221
Noro, L. 1208

O'Gara, R. W. 1224
Onesti, P. 1341
Osato, T. 1260
Osske, G. 1241
Ostertag, W. 1185
Ozer, H. L. 1280

Pachman, D. J. 1218
Page, M. A. 1187
Paley, W. B. 1344
Paloyan, D. 1179
Pamukcu, A. M. 1222
Papworth, D. G. 1173
Parks, V. R. 1212,1213
Parmentier, R.. 1296
Parshad, R. 1168
Paul, J. 1159
Pearson, G. 1348
Peters, E. A. 1248
Petersen, B. 1332
Petkov, G. 1256
Phaneuf, G. J. 1344
Phillips, S. J. 1334
Piaget, F. 1335
Pickren, J. W. 1211
Pierotti, Th. 1288
Pilch, Y. H. 1192
Pinaudeau, Y. 1290
Pipkin, G. E. 1221
Pitot, H. C. 1155
Planteydt, H. T. 1201
Pollard, M. 1190
Pössnerová, V. 1347
Potter, V. R. 1195
Pressman, D. 1244
Price, J. M. 1222
Purchase, H. G. 1262

Rabson, A. 1247
Rapp, F. 1282,1283
Reuber, M. D. 1196,1235
Rich, M. A. 1252
Richart, R. M. 1318
Riebeck, P. A. 1253
Rier, J. P., Jr. 1180
Ríman, J. 1264
Rizki, R. M. 1189
Rizki, T. M. 1189
Roddick, J. W. 1311
Rogers, A. E. 1239
Roque, A. L. 1211
Rose, E. F. 1219
Ross, E. M. 1256
Rovin, S. 1216
Roy, J. 1299
Roylance, P. J. 1320
Rush, B. F. 1216

Saegesser, F. 1154
Saffiotti, U. 1136,1220
Saldeen, T. 1315
Sanchez Muros, J. 1175
Sandbank, M. 1326
Sandorfy, C. 1245
Sanford, K. K. 1168
Sato, C. 1167
Sato, K. 1176

ato, T. 1163
cazziga, B. R. 1152
chäfer, C. H. 1313
chlegel, J. U. 1221
chneid, V. 1314
chneider, R. 1292
choental, R. 1148
choltze, P. 1242
cholz, W. 1298
chreiber, D. 1242,1243
chultz, R. D. 1272
churr, P. E. 1181
chwartz, G. F. 1309
chweisguth, O. 1324
ellers, A. H. 1300
eto, T. 1230
hah, K. V. 1279
heldon, W. F. 1163
himkin, M. B. 1198
ibal, L. R. 1278
iebert, G. 1238
iegal, A. M. 1172
igidin, Ia. A. 1336
imard, A. 1234
impson, C. F. 1265
ingh, S. 1245
innhuber, R. O. 1226,1227
ivak, A. 1200
korochodzki, L. 1285
loane, J. A. 1329
mith, H. C. 1195
mith, K. O. 1248
nell, K. C. 1291
ohier, R. 1249
okolovsky, R. M. 1150
olomon, J. J. 1262
ommers, S. C. 1344
orof, S. 1237,1238
ottong, P. 1259
patz, M. 1146
Staples, P. J. 1342
Štark, O. 1346
Steeves, R. A. 1254
Stewart, H. L. 1291
Stumphius, J. 1202
Stutman, O. 1186
Subhiyah, B. W. 1295
Sugimori, H. 1316
Sugiyama, S. 1230
Sunderman, F. W., Jr. 1231
Swain, L. W. 1180
Sykes, J. A. 1277

Takemoto, K. K. 1280
Talal, N. 1342
Tamagaki, H. 1163
Tatsuno, T. 1184
Tausch, H. 1242
Taylor, D. O. N. 1293
Tayot, J. 1134,1205
Terracini, B. 1130
Tevethia, S. S. 1282,1283
Theilen, G. H. 1271
Thorslund, T. W. 1176
Ting, R. C. Y. 1280
Toplin, I. 1259
Tortora, M. 1321
Trainin, Z. 1270
Traynor, J. E. 1172
Turiaf, J. 1204
Tweeddale, D. N. 1311
Tyrrell, S. 1247

Ueberschär, S. 1273
Urbaneck, D. 1268

Valdmanis, A. 1348
Van Der Maaten, M. J. 1274
Van Duuren, B. L. 1131,1138,1200
Varet, B. 1129
Vepřek, L. 1264
Veret, J. 1205
Vesselinovitch, S. D. 1193
Virag, I. 1286
Volfson, N. I. 1150

Wales, J. H. 1226,1227
Wanebo, C. K. 1176
Ward, J. M. 1271
Waridel, D. 1154
Warzok, R. 1241,1243
Wattenberg, L. W. 1187
Weber, A. F. 1269
Whitescarver, J. 1277
Wieder, R. 1198
Wilson, H. 1302
Winqvist, G. 1284
Wiśniowska, J. 1153
Wittmann, W. 1268
Witwicki, T. 1177
Wogan, G. N. 1143,1145
Wood, J. W. 1163
Woodard, J. R. 1304
Woodliff, H. J. 1341
Wynder, E. L. 1132

Yagi, Y. 1244
Yamasawa, S. 1191
Yilmazer, S. 1272
Young, V. R. 1239
Yunis, E. J. 1186

Zacharia, T. P. 1190
Zangeneh, F. 1328
Zavadil, M. 1314
Zichel, R. 1313

SUBJECT INDEX

- ABNORMALITIES
  - connective tissue tumors, child: 1329
  - eye (aniridia), Wilms' tumor: 1304
- 2-ACETYLAMINOFLUORENE (See N-2-Fluorenylacetamide)
- AFLATOXIN(S)
  - isolation, aged or cured meat: 1228
  - liver tumors, animal: 1225
  - mechanism of action, review: 1145
  - toxicity, animal and human, review: 1149
    - liver, animal: 1225
- AFLATOXIN B_1
  - liver tumors, trout: 1226,1227
- AIR POLLUTION
  - ^{238}Pu fallout, analysis: 1179
- AMIDES, AROMATIC
  - carcinogenesis, mechanism, review: 1142
- AMINES, AROMATIC
  - carcinogenesis, mechanism, review: 1142
- ANTHRACENE
  - photodimers, infrared spectra: 1245
- ANTIMETABOLITES
  - 5-bromo-2'-deoxyuridine + 5-fluorouracil, somatic cell lesions (wing), *Drosophila*: 1189
- ANTINEOPLASTIC AGENTS
  - nitrogen mustard series, exptl. and human carcinogenesis, review: 1141
- ASBESTOS (See also under Silicates)
  - carcinogenesis, review: 1134
  - occupational exposure
    - bronchial cancer: 1204,1205
    - lung cancer and other diseases: 1207
    - mesothelioma: 1201,1204,1206
      - role of iron oxides: 1202
    - smoking, Finland: 1208
  - pleural mesothelioma, pathogenesis: 1203
    - review: 1162
  - "solid-state" carcinogenesis, review: 1140
- AZOBENZENE, 4-DIMETHYLAMINO-
  - liver tumors, enzymology, rat: 1236
    - mitotic cycle, rat: 1234
- AZOBENZENE, 3'-METHYL-4-DIMETHYLAMINO-
  - effect on liver nuclear proteins, rat: 1237, 1238
- AZOXYMETHANOL, METHYL- (See Cycasin aglycone)

- BENZANTHRACENE
  - photodimers, infrared spectra: 1245
- BENZANTHRACENE, 7,12-DIMETHYL
  - composition for i.v. admin.: 1181
  - DNA binding, mechanism, normal and tumor cells: 1240
  - effect on cervix and vagina, mouse, review: 1150
  - mammary carcinogenesis, role of estrogens, rat, review: 1139
  - skin tumors
    - mouse: 1194,1197
    - primate: 1191
    - promotion, mechanism, review: 1138
      - mouse: 1199,1200,1209
  - thymoma, host immunity, mouse: 1186
- BENZENE, 1-FLUORO-2,4-DINITRO-
  - skin tumor promotion, mouse: 1197
- BENZOTHIAZOLE DERIVATIVES
  - benzpyrene hydroxylase induction, rat liver and lung: 1187
- 3,4-BENZPYRENE
  - hydroxylase, induction, phenylbenzothiazole derivatives, structure-activity relationship, rat liver and lung: 1187
  - skin tumors, croton oil promotion, effect of griseofulvin, mouse: 1193
- BETEL
  - chewing, oropharyngeal cancer, review: 1133
- BILIARY TRACT DISEASES
  - cholelithiasis, cystic duct stump cancer, complication of cholecystectomy: 1334
- BILIARY TRACT NEOPLASMS
  - cystic duct remnant: 1334
- BLADDER CARCINOGENESIS
  - bracken fern (*Pteris aquilina*), cattle: 1222
    - exptl., review: 1147
- BLADDER NEOPLASMS
  - urinary chemiluminescence, smoking: 1221
- BLOOD
  - α-globulins, methylcholanthrene sarcoma, germfree rat: 1190
  - immunoglobulins, bovine leukosis: 1270
- BLOOD GROUPS
  - ABO and others (Rh, MN, P, Gm, haptoglobin), human cancer: 1298
  - Rh and others, linkage with familial nevoid basal cell carcinoma syndrome: 1325
- BONE MARROW
  - radiation damage, erythroleukemia virus susceptibility, chick: 1171
- BONE NEOPLASMS
  - fibrosarcoma, irradiated bone diseases, human: 1165
    - pre-existing diseases, human: 1165
  - "solid-state" reaction to fibrosis, review: 1140
- BRAIN NEOPLASMS
  - epidemiology, Canada (Ontario): 1300
  - induction
    - methylnitrosourea, enzymology, rat: 1241
      - rabbit: 1243
      - rat: 1242
- BREAST NEOPLASMS (See Mammary neoplasms, human)
- BRONCHUS
  - epithelium, ultrastructure, normal dog: 1212
      - smoking, dog: 1213
- BRONCHUS NEOPLASMS
  - asbestos exposure: 1204,1205
  - blood groups (ABO, Rh, MN, P, Gm, haptoglobin): 1298
  - hypertrophic pulmonary osteoarthropathy: 1331
  - smoking, brothers: 1343

- CAFFEINE
  - complex formation with carcinogens: 1182
  - mutagenesis, exptl. and human: 1185
- CALCIUM HYDROXIDE
  - cocarcinogenesis, tobacco and other plants (chewing), review: 1133

ARCINOGENESIS, CHEMICAL (See also Cocarcinogenesis, Radiation carcinogenesis and Viral carcinogenesis)
- animal and human, comparison, review: 1141
- aromatic amines and amides, mechanism, review: 1142
- cocarcinogens, mechanism of action, review: 1137
- combined action of carcinogens, review: 1160
- newborn and infant mice, review: 1130
- occupational ear/nose/throat cancer, review: 1135
- respiratory tract, animal, review: 1136
- review: 1159
- screening methods, review: 1127
- "solid-state" type, review: 1140

ARCINOGENS (CHEMICAL)
- animal and human responses, comparison, review: 1141
- complex formation with biological substances: 1182
- environmental, review: 1157
- foods, review: 1143

ARDIOVASCULAR SYSTEM
- effect of smoking, human: 1217

ELL GROWTH KINETICS (See also Malignant transformation)
- bovine leukosis: 1272
- cervix dysplasia to carcinoma *in situ*: 1318
- erythropoiesis, rat: 1320
- neoplastic conversion, oxygen effects, mouse embryo cells: 1168

ENTRAL NERVOUS SYSTEM NEOPLASMS
- epidemiology, Canada (Ontario): 1300
- induction
  - methylnitrosourea, enzymology, rat: 1241
    - rabbit: 1243
    - rat: 1242

ERVIX UTERI
- effect of hormones and carcinogens, mouse, review: 1150

ERVIX UTERI NEOPLASMS
- blood groups (ABO, Rh, MN, P, Gm, haptoglobin): 1298
- diabetes mellitus: 1313
- diagnosis, methods: 1310,1311
- epidemiology, Italy (Ferrara): 1321
- family incidence: 1316
- malignancy associated changes, pathogenesis: 1338
- primary carcinoma and sarcoma: 1344
- progression of dysplasia to carcinoma *in situ*: 1318
- risk, prostitutes: 1312

CHROMOSOMES
- acute erythroleukemia, children: 1349
- Fedex-WP rat tumor, long-term cell culture: 1346
- leukemia and allied diseases: 1341
- neuroblastoma, infant: 1340
- radiation-induced and virus-producing thymic lymphoma, mouse: 1170
- sex, duplication of Y chromosome, leukemia: 1348
  - index of hormone sensitivity, breast cancer: 1345
- short-term leukemia cell cultures: 1347

CHROMOSOMES (Contd.)
- virus-containing human leukemia and Burkitt lymphoma cells: 1260

COCARCINOGENESIS (See also Carcinogenesis, chemical)
- croton oil, mechanism, review: 1138
  - mouse skin: 1200
- cyclopropenoid fatty acids, liver, trout: 1226,1227
- mechanism, review: 1137,1160
- plant oils, mouse skin: 1199

COLON NEOPLASMS
- epidemiology, Canada (Manitoba), ethnic groups: 1308
- ulcerative colitis, risk, review: 1154

CONGENITAL ANOMALIES (See Abnormalities)

CONNECTIVE TISSUE NEOPLASMS
- congenital defects, child: 1329
  - rhabdomyosarcoma, familial nevoid basal cell carcinoma syndrome, child: 1324
- traumatic chondrosarcoma, knee joint: 1177

CONTRAST MEDIA
- ethiodol, s.c. sarcoma, host immunity, mouse: 1192

CORPUS UTERI NEOPLASMS
- blood groups (ABO, Rh, MN, P, Gm, haptoglobin): 1298
- diabetes mellitus: 1313
- endometrium cancer, pituitary-hypothalamus hyperfunction: 1330
- epidemiology, Italy (Ferrara): 1321
- trophoblastic tumors, immunology (histocompatibility system): 1314

COUMARIN, 3-METHYL-
- cocarcinogenesis, liver, trout: 1226

CROTON OIL
- active principles (phorbol esters), mechanism of action, review: 1138
- mechanism of action, mouse skin: 1200
- skin tumor promotion, mouse: 1193,1199

CYCASIN
- mechanism of action, review: 1146

CYCASIN AGLYCONE (methylazoxymethanol)
- mechanism of action, review: 1146

DIABETES MELLITUS
- female genital cancer: 1313

DIET (See also under Foods)
- esophagus cancer, South Africa (Transkei): 1219
- lipotrope-deficient, fatty nutritional cirrhosis, rat: 1239

DISEASE TRANSMISSION
- all tumors, dogs and their owners, California (Alameda County): 1292
- SV40 antibodies, rhesus monkeys to man, India: 1279

DMBA (See Benzanthracene, 7,12-dimethyl-)

ENDOCRINE ABLATION
- oophorectomy or orchiectomy, effect on fluorenyldiacetamide liver carcinogenesis, rat: 1235

ENDOCRINE ORGANS
- avian leukosis virus multiplication, chicken: 1263

ENVIRONMENT
- climate, Hodgkin's disease, young adults, U.S. (South and Rocky Mountains): 1297
- health hazards, review: 1157
- isolation or crowding, effect on transplanted tumors, mouse: 1339

ENZYMES
- benzpyrene hydroxylase, induction, structure-activity relationship (phenylbenzothiazole series), rat liver and lung: 1187
- glucose-6-phosphatase, deficiency (Type I glycogen storage disease), hepatoma, brothers: 1328
  - liver carcinogenesis, rat: 1236
- metabolism in alveolar macrophages, lung tumors of smokers and non-smokers: 1211
- methylnitrosourea-induced CNS tumors, rat: 1241
- RNA polymerase, carcinogen effects, rat liver: 1231

EPIDEMIOLOGY
- all tumors
  - children, Israel, ethnic groups: 1286
  - dogs and their owners, California (Alameda County): 1292
  - Italy (Salerno): 1322
  - Poland (Warsaw): 1317
  - Scotland: 1287
  - SV40 antibodies, India: 1279
- asbestosis, smoking, Finland: 1208
- benign skin tumors (histiocytoma), dogs, California: 1293
- breast cancer, Italy (Ferrara): 1321
- Burkitt lymphoma, Congo (Katanga): 1296
  - possible association with malaria, review: 1156
- cervix cancer
  - Italy (Ferrara): 1321
  - risk, prostitutes: 1312
- cervix dysplasia, methods: 1318
- esophagus cancer
  - environmental factors, South Africa (Transkei): 1219
  - plant remedies, Curacao: 1223,1224
  - water pollution, Curacao: 1223
- g.i. cancer, Canada (Manitoba), ethnic groups: 1308
- Hodgkin's disease, age and geographical variations, U.S.: 1297
- leukemia
  - children, Ohio (Cleveland and suburbs): 1294
    - methods, Poland: 1285
  - Iraq (Baghdad): 1295
- liver cancer, carcinogen-containing foods, review: 1143
- lung cancer
  - Australia: 1302
  - Hiroshima and Nagasaki, smoking: 1176
- nasopharynx cancer, Nigeria: 1301
- solid tumors, children, methods, Poland: 1285
- thyroid cancer
  - high-goiter (Colombia) or low-goiter area (Connecticut): 1303
  - Hiroshima and Nagasaki: 1163
- uterus cancer, Italy (Ferrara): 1321

ESOPHAGUS NEOPLASMS
- environmental factors, South Africa (Transkei): 1219
- esophageal diverticuli: 1335
- plant remedies, Curacao: 1223,1224
- tobacco use, South Africa (Transkei): 1219
- water pollution, Curacao: 1223

ETHIODOL
- s.c. sarcoma, host immunity, mouse: 1192

EYE DISEASES
- congenital aniridia, with Wilms' tumor: 1304

FATTY ACIDS, CYCLOPROPENOID
- cocarcinogenesis, liver, trout: 1226,1227

N-2-FLUORENYLACETAMIDE
- hepatoma, trout: 1227
  - tumor antigens, rat: 1244

N-2-FLUORENYLDIACETAMIDE
- liver tumors, hormone effects, rat: 1235

FOODS (See also under Diet)
- animal feeds, toxic fungi: 1229
- aged or cured meat, aflatoxin-producing fungi: 1228
- carcinogen content, review: 1143,1144
- fermented (Japanese), mycotoxin production: 1230

FUNGI
- extracts, isolation and estrogenic activities, exptl.: 1183
  - toxicity, mouse: 1184
- human pathogens, s.c. tumors, mouse: 1198
- Japanese fermented foods, mycotoxin production: 1230
- toxicity, rats and birds: 1229

Fusarium nivale EXTRACT
- toxicity, mouse: 1184

GASTROINTESTINAL CARCINOGENESIS
- bracken fern (*Pteris aquilina*), exptl., review: 1147
  - rat: 1222
- Curacao folk remedies, mouse: 1224

GASTROINTESTINAL DISEASES
- ulcerative colitis, cancer risk, review: 1154

GASTROINTESTINAL NEOPLASMS
- "cancer family" syndrome: 1323
- epidemiology, Scotland: 1287

GENETICS, ANIMAL
- autoimmunity and lymphoma, NZB mice and hybrids: 1342

GENETICS, CELLULAR
- hepatoma, mechanism, review: 1155

GENETICS, HUMAN
- "cancer family" syndrome: 1323
- congenital sarcoma, family cancer history: 1306
- connective tissue tumors, congenital defects, child: 1329
- familial
  - bronchus cancer (brothers; smoking) and genital or breast cancer (sisters): 1343
  - mycosis fungoides, sister and brother: 1326,1327

NETICS, HUMAN (Contd.)
- familial (Contd.)
  - nevoid basal cell carcinoma syndrome,
    - blood groups (Rh and others), linkage analysis: 1325
    - congenital rhabdomyosarcoma, child: 1324
- genetically determined cancer, cases and review: 1323
- hepatorenal glycogen storage disease, hepatoma, brothers: 1328
- non-familial aniridia with Wilms' tumor: 1304
- relatives of women with cervix cancer: 1316

NITAL NEOPLASMS, FEMALE
- diabetes mellitus: 1313
- familial (brothers with bronchus cancer, sister with breast cancer): 1343

SSYPOL
- cocarcinogenesis, liver, trout: 1226

ISEOFULVIN
- effect on croton oil cocarcinogenesis, mouse skin: 1193

EAD AND NECK NEOPLASMS
- ear/nose/throat area, occupational, review: 1135

EART DISEASES
- myocardial infarct, cancer incidence: 1290

EART NEOPLASMS
- metastatic, incidence: 1299

EMATOPOIESIS
- platelets, effect of Rauscher leukemia virus, mouse: 1256
- RBC
  - effect of polycythemia-inducing virus, mouse: 1254
    - Rauscher leukemia virus, mouse: 1255
  - kinetics, rat: 1320

ORMONES:
- effect on cervix and vagina, mouse, review: 1150
- estrogens
  - fungal, isolation and biological activities: 1183
  - mammary carcinogenesis, rat, review: 1139
    - tumor regression, rat: 1188
- growth, effect on fluorenyldiacetamide liver carcinogenesis, rat: 1235
- sensitivity, and sex chromatin, breast cancer: 1345

YDROCARBONS, POLYCYCLIC AROMATIC
- complex formation with biological substances: 1182

MMUNITY
- avian leukosis/sarcoma viruses, human leukemia: 1262
- cancer, review (book): 1158
- chemically induced tumors, rat or mouse: 1192,1244
- histocompatibility system, human trophoblastic tumors: 1314
- mammary tumor virus antibodies, mouse, rabbit and monkey: 1278
- SV40
  - hamster tumor, antiserum effect: 1282

IMMUNITY (Contd.)
- SV40 (Contd.)
  - human cancer, India: 1279
  - transformed cells: 1283
- thymectomized mice with transplanted thymoma: 1186
- virus-induced tumors, review: 1151

IMMUNITY DISORDERS
- autoimmunity, and lymphoma, New Zealand Black mice: 1129,1342
- inflammation and fibrosis, "solid-state" carcinogenesis, human, review: 1140
- and lymphoma, incidence, aged *Mastomys natalensis*: 1291
- rheumatoid arthritis, leukemic transformation, mechanism: 1336

INJURIES (See also under Scar tissue)
- burns, methylcholanthrene skin carcinogenesis, mouse: 1169
- electrical or surgical, skin sarcoma: 1306
- knee joint, chondrosarcoma: 1177

INTERFERON
- effect on virus-induced or spontaneous leukemia, mouse: 1250

INTESTINE, SMALL, NEOPLASMS
- second primary tumor incidence: 1289

IRON OXIDES
- possible cocarcinogenesis with asbestos (Occupational exposure): 1202

JOINT DISEASES
- hypertrophic pulmonary osteoarthropathy, with bronchial cancer: 1331

KIDNEY DISEASES
- Type I glycogen storage disease, with hepatoma, brothers: 1328
- Wilms' tumor, with aniridia, child: 1304

LARYNX NEOPLASMS
- irradiated larynx papilloma, child: 1166

LASIOCARPINE
- liver toxicity, effect of dietary lipotropes, pregnant and fetal rat: 1233

LEUKEMIA, EXPERIMENTAL (See also under Radiation leukemogenesis and Virus, leukemia/lymphoma)
- AKR (spontaneous or viral), interferon effects, mouse: 1250
- radiation-induced, pathogenesis, mouse: 1167

LEUKEMIA, HUMAN
- avian leukosis/sarcoma virus antibodies: 1262
- epidemiology
  - children, methods, Poland: 1285
    - Ohio (Cleveland and suburbs): 1294
  - Iraq (Baghdad): 1295
- karyotype: 1341
  - acute erythroleukemia, children: 1349
  - duplication of Y chromosome: 1348
  - short-term cultures: 1347
  - virus-containing cell lines: 1260
- possible transformation from rheumatoid arthritis: 1336

LEUKEMOGENESIS (EXPERIMENTAL)
- radiation, monkey: 1172

LEUKEMOGENESIS (EXPERIMENTAL) (Contd.)

- urethan, mouse: 1232

LEUKOSIS (LEUKEMIA), AVIAN

- erythroleukemia virus-induced, radiation effects, chick: 1171
- ocular, pathology, virus particles: 1265
- virus multiplication, endocrine organs, chicken: 1263

LEUKOSIS (LEUKEMIA), BOVINE

- juvenile and adult, ultrastructure: 1284
- lymphocyte growth patterns: 1272
  - morphology: 1273
- pathology: 1271
- peripheral blood picture: 1268
- preleukemic stage, WBC ultrastructure: 1269
- serum immunoglobulins: 1270
- virus isolation and properties: 1266,1267,1274

LIVER

- benzpyrene hydroxylase induction, phenylbenzothiazoles, rat: 1187
- nuclear proteins, effect of azo dye carcinogen, rat: 1237,1238
- RNA polymerase, effect of carcinogen, rat: 1231
- toxicity, aflatoxin, animal and human, review: 1149
  - lasiocarpine, effect of dietary lipotropes, pregnant and fetal rat: 1233
  - pyrrolizidine alkaloids, exptl. and human, review: 1148

LIVER CARCINOGENESIS

- aflatoxin, animal: 1225
    - review: 1149
  - + cocarcinogens, trout: 1226,1227
- cirrhosis-inducing diet for carcinogen testing, rat: 1239
- dimethylaminoazobenzene, enzymology, rat: 1236
  - mitotic cycle, rat: 1234
- fluorenylacetamide + fatty acids, trout: 1227
- fluorenyldiacetamide, hormone effects, rat: 1235
- food constituents, review: 1143,1144
- pyrrolizidine alkaloids, exptl. and human, review: 1148
- urethan, effect of hepatectomy, mouse: 1232

LIVER DISEASES

- cirrhosis, formation of liver metastases, exptl. and human: 1315
  - lipotrope-deficient diet, rat: 1239
- Type I glycogen storage disease, hepatoma, brothers: 1328

LIVER NEOPLASMS

- cell genetics, mechanism, review: 1155
- epidemiology, carcinogen-containing foods, review: 1143
- metastatic, effect of cirrhosis, exptl. and human: 1315
- mycotoxin production by fermented foods, Japan: 1230
- "solid-state" reaction to fibrosis, review: 1140
- Type I glycogen storage disease, brothers: 1328

LUNG

- benzpyrene hydroxylase induction, phenylbenzothiazoles, rat: 1187

LUNG (Contd.)

- toxicity, cigarette smoke, dog: 1215

LUNG CARCINOGENESIS

- tobacco, review: 1131,1132
- urethan, effect of hepatectomy, mouse: 1232

LUNG DISEASES

- smoking, sputum cytology: 1210

LUNG NEOPLASMS

- epidemiology, Australia: 1302
  - Hiroshima and Nagasaki: 1176
- exptl. models of human cancer, review: 1136
- occupational asbestos exposure: 1207
- pathogenesis: 1337
- smoking: 1214, 1246
  - enzyme metabolism of alveolar macrophages: 1211
  - Hiroshima and Nagasaki: 1176
  - low- or high-nitrate tobacco, Britain and France: 1132
  - sputum cytology: 1210
- "solid-state" reaction to fibrosis (TB, asbestos, silicosis), review: 1140

LYMPHOMA, MALIGNANT, EXPERIMENTAL

- genetic, and autoimmunity, New Zealand Black mice: 1129,1342
- spontaneous, incidence, aged *Mastomys natalensis*: 1291

LYMPHOMA, MALIGNANT, HUMAN

- Burkitt
  - distribution, association with malaria, review: 1156
    - Congo (Katanga): 1296
  - virus-containing cell lines, karyotype: 1260
- Hodgkin's disease, age and geographical variations, U.S.: 1297
- karyotype: 1341
- mycosis fungoides, sister and brother: 1326, 1327

MALARIA

- distribution, and Burkitt lymphoma, review: 1156

MALIGNANT TRANSFORMATION (See also under Cell growth kinetics)

- alveolar wall cell to lung cancer: 1337
- asbestosis to mesothelioma, mechanism: 1203
- cystic duct stump (post-cholecystectomy) to adenocarcinoma: 1334
- esophageal diverticuli to carcinoma: 1335
- intraductal papilloma or papillomatosis to breast cancer: 1332
- malignancy associated nuclear morphology: 1338
- Mibelli's porokeratosis to skin cancer: 1333
- rheumatoid arthritis to leukemia, mechanism: 1336
- ulcerative colitis, review: 1154

MAMMARY CARCINOGENESIS (EXPERIMENTAL)

- estrone, tumor regression patterns, rat: 1188
- role of estrogens, rat, review: 1139

MAMMARY NEOPLASMS, EXPERIMENTAL (See also under Virus, mammary tumor)

- virus-producing, morphology, mouse: 1277

MAMMARY NEOPLASMS, HUMAN

- blood groups (ABO, Rh, MN, P, Gm, haptoglobin): 1298

MMARY NEOPLASMS, HUMAN (Contd.)
  epidemiology, Italy (Ferrara): 1321
  familial (bronchus cancer in brothers, genital cancer in sister): 1343
  genetic risk: 1323
  intraductal papilloma or papillomatosis: 1332
  medullary (solid circumscribed) carcinoma, incidence: 1309
  myocardial infarct: 1290
  sex chromatin as index of hormone sensitivity: 1345
  "solid-state" reaction to fibrosis, review: 1140
  virus-like particles: 1276
ETABOLISM DISORDERS
  glucose-6-phosphatase deficiency (Type I glycogen storage disease), with hepatoma, brothers: 1328
ETHANOL, METHYLAZOXY- (See Cycasin aglycone)
-METHYLCHOLANTHRENE
  mammary carcinogenesis, role of estrogens, rat, review: 1139
  s.c. sarcoma, host immunity, mouse: 1192
    serum α-globulins, germfree rat: 1190
  skin cancer, burn scar tissue, mouse: 1169
  thyroiditis with/without s.c. tumors, rat: 1196
INERALS
  deficiency, effect on Agrobacterium tumefaciens tumors, tomato plants: 1180
  soil, and esophagus cancer incidence, South Africa (Transkei): 1219
ITOSIS
  dimethylaminoazobenzene liver carcinogenesis, rat: 1234
OUTH NEOPLASMS
  anaplastic transformation after radiotherapy: 1216
  tobacco chewing and poor oral hygiene: 1216
    review: 1133
UTAGENESIS
  antimetabolites, Drosophila: 1189
  caffeine, exptl. and human: 1185

ASOPHARYNX NEOPLASMS
  epidemiology, Nigeria: 1301
EOPLASMS
  immunology, review (book): 1158
EOPLASMS, EXPERIMENTAL
  B-16 melanoma (mouse), effect of environmental conditions (crowding or isolation): 1339
  Ehrlich carcinoma (mouse), cells, dimethylbenzanthracene binding to DNA, mechanism: 1240
  Fedex-WP tumor (rat), long-term culture, properties: 1346
  Krebs-II carcinoma (mouse), effect of environmental conditions (isolation or crowding): 1339
  newborn and infant mice, review: 1130
  Rous sarcoma (rat), cirrhotic or non-cirrhotic liver: 1315
  spontaneous, dogs, cancer in their owners: 1292
NEOPLASMS, HUMAN
  blood groups (ABO, Rh, MN, P, Gm, haptoglobin): 1298
  double and triple primary, incidence: 1288, 1289
  epidemiology
    Israel, children, ethnic groups: 1286
    Italy (Salerno): 1322
    owners of dogs, California (Alameda County): 1292
    Poland, children, methods: 1285
      (Warsaw): 1317
    Scotland: 1287
  heart metastases: 1299
  liver metastases, effect of cirrhosis: 1315
  small intestine and second primary, incidence: 1289
  SV40 antibodies, India: 1279
NEUROBLASTOMA
  infant, karyotype: 1340
NICKEL CARBONYL
  effect on RNA polymerase, rat liver: 1231
NITROSAMINE, DIETHYL-
  respiratory tumors, hamster: 1220
NITROSOUREA, METHYL-
  CNS and other tumors, rabbit: 1243
    rat: 1241,1242
NIVALENOL (Fusarium nivale)
  toxicity, mouse: 1184
NUCLEIC ACIDS, DNA
  dimethylbenzanthracene binding, mechanism, normal and tumor cells: 1240
  effect of aflatoxin, mechanism, review: 1145
    hydroxyurea, normal tissues, mouse: 1195
NUCLEIC ACIDS, RNA
  effect of aflatoxin, mechanism, review: 1145
    hydroxyurea, normal tissues, mouse: 1195
  enzymes mobilizing, effect of carcinogen, rat liver: 1231
  membrane-associated messenger RNA template (membron), cell genetics, hepatoma, review: 1155
  mouse leukemia virus, structure: 1253,1257
  Rous sarcoma virus, structure: 1257
NUCLEOSIDES
  complex formation with carcinogens: 1182

OCCUPATIONAL DISEASES
  asbestos exposure
    mesothelioma: 1201,1206
      review: 1162
      role of iron oxides: 1202
    respiratory cancer: 1204,1205,1207
      review: 1134
    smoking, Finland: 1208
  ear/nose/throat cancer, review: 1135
  radiodermatitis, skin cancer, physicians: 1174
  solar cancer of skin, farmers, Spain: 1175
OILS
  spurge family (Euphorbiaceae), skin tumor promotion, mouse: 1199
OXYGEN
  effect on neoplastic conversion, mouse embryo cells: 1168

PERITONEAL NEOPLASMS
  mesothelioma, asbestos exposure: 1201
PETROLEUM,
  water contamination, esophagus cancer, Curacao: 1223
PHORBOL (See under Croton oil)
PITUITARY-HYPOTHALAMUS AXIS
  hyperfunction, and endometrial cancer: 1330
PLANT NEOPLASMS
  Agrobacterium tumefaciens-induced, effect of mineral deficiency, tomato plants: 1180
PLANTS AND PLANT EXTRACTS
  bracken fern (*Pteris aquilina*)
    bladder tumors, cattle: 1222
    g.i. tumors, rat: 1222
    mechanism of action, review: 1147
  food, carcinogen content, review: 1143
  medicinal
    carcinogen content, review: 1143
    esophagus cancer, South Africa (Transkei): 1219
      Curacao: 1223,1224
  spurge family (Euphorbiaceae), cocarcinogenesis, mouse skin: 1199
PLEURAL NEOPLASMS
  mesothelioma, asbestos exposure: 1201,1203, 1204,1206
      review: 1162
      role of iron oxides: 1202
POLYMERS, ORGANIC
  "solid-state" carcinogenesis, review: 1140
PREGNANCY
  lasiocarpine hepatotoxicity, effect of dietary lipotropes, rat: 1233
β-PROPIOLACTONE
  skin tumors, effect of hydroxyurea, mouse: 1195
PROSTATE NEOPLASMS
  myocardial infarct: 1290
  pathogenesis: 1319
PROTEINS
  nuclear, effect of azo dye carcinogen, rat liver: 1237,1238
PYRROLIZIDINE ALKALOIDS
  liver toxicity and carcinogenesis, exptl. and human, review: 1148

RADIATION
  effect on erythroleukemia virus sensitivity, chick: 1171
  transformation, mouth cancer, human: 1216
RADIATION CARCINOGENESIS
  bone, fibrosarcoma, human: 1165
  laryngeal papilloma, child: 1166
  lung, Hiroshima and Nagasaki, smoking: 1176
  occupational ear/nose/throat cancer, review: 1135
  respiratory tract, animal, review: 1136
  screening methods, review: 1127
  skin
    dosimetry, mouse: 1173
    human: 1164
    occupational, physicians: 1174
    sunlight, farmers, Spain: 1175
RADIATION CARCINOGENESIS, (Contd.)
      Japan: 1305
      porokeratosis with malignant degeneration: 1333
  thyroid, children and adolescents: 1178
    Hiroshima and Nagasaki: 1163
RADIATION LEUKEMOGENESIS
  monkey: 1172
  mouse: 1167
    virus production: 1170
RADIOISOTOPES
^{238}Pu, fallout, analysis: 1179
RECTUM NEOPLASMS
  epidemiology, Canada (Manitoba), ethnic groups: 1308
  ulcerative colitis, risk, review: 1154
RESPIRATORY TRACT CARCINOGENESIS
  animal, review: 1136
  asbestos, review: 1134
  diethylnitrosamine, hamster: 1220
RESPIRATORY TRACT NEOPLASMS
  epidemiology, Scotland: 1287
  smoking, review: 1153,1161
RIBOFLAVIN-5'-PHOSPHATE
  complex formation with carcinogens: 1182

SALIVARY GLAND NEOPLASMS
  polyoma virus-induced, ultrastructure, mouse: 1281
SCAR TISSUE (See also under Injuries)
  burns, methylcholanthrene skin carcinogenesis, mouse: 1169
  electrical burn or surgery, skin sarcoma: 1306
SEX
  chromosomes, duplication of Y chromosome, acute leukemia: 1348
    index of hormone sensitivity, breast cancer, 1345
SILICATES (See also under Asbestos)
  soil levels, esophagus cancer, South Africa (Transkei): 1219
  "solid-state" carcinogenesis, review: 1140
SKIN CARCINOGENESIS
  adenovirus-12, effect of adeno-associated virus, hamster: 1248
  benzpyrene + croton oil, effect of griseofulvin, mouse: 1193
  dimethylbenzanthracene
    mouse: 1194
    primate: 1191
    promotion (mouse)
      croton oil: 1199,1200
        review: 1138
      1-fluoro-2,4-dinitrobenzene: 1197
      plant oils: 1199
      tobacco extracts: 1209
  ethiodol, s.c. sarcoma, host immunity, mouse: 1192
  food constituents, review: 1144
  human pathogenic fungi s.c. sarcoma, mouse: 1198
  methylcholanthrene (s.c. tissue), mouse: 1169,1192
    rat: 1190,1196

SKIN CARCINOGENESIS (Contd.)
  radiation, dosimetry, mouse: 1173
    human: 1164,1174,1175
  tobacco, review: 1131,1132
SKIN NEOPLASMS
  benign (histiocytoma), epidemiology, dogs, California: 1293
  epidemiology, Colorado, comparison with Japan: 1305
    Japan, skin pigmentation and sun exposure: 1305
  familial nevoid basal cell carcinoma
    blood groups (Rh and others): 1325
    congenital rhabdomyosarcoma, child: 1324
    genetic risk: 1323
  melanoma, genetic risk: 1323
  Mibelli's porokeratosis: 1333
  sarcoma, incidence: 1306
SMOKING (See Tobacco smoking)
SOIL
  silica and other minerals, esophagus cancer, South Africa (Transkei): 1219
SPINAL CORD NEOPLASMS
  epidemiology, Canada (Ontario): 1300
STOMACH NEOPLASMS
  epidemiology, Canada (Manitoba), ethnic groups: 1308
  mycotoxin production by fermented foods, Japan: 1230
SURGERY
  cholecystectomy, complications, cancer of cystic duct stump: 1334

TETRACENE
  photodimers, infrared spectra: 1245
THYMOMA
  dimethylbenzanthracene-induced, host immunity, mouse: 1186
THYROID DISEASES
  goiter, thyroid cancer, Colombia and Connecticut: 1303
      review: 1152
  thyroiditis, methylcholanthrene induction, rat: 1196
THYROID NEOPLASMS
  epidemiology, high-goiter (Colombia) or low-goiter areas (Connecticut): 1303
  goiter, review: 1152
  radiation exposure, children and adolescents: 1178
    Hiroshima and Nagasaki: 1163
TOBACCO
  carcinogenesis, review: 1131
  chewing, oropharyngeal cancer, review: 1133
    and snuff, mouth cancer: 1216
  esophagus cancer, South Africa (Transkei): 1219
  unburned, extracts, tumor-promoting effects, mouse skin: 1209
TOBACCO SMOKE
  admin. and dosage, dog (apparatus and methods): 1215
  carcinogenesis, bioassay methods, review: 1132
  effect on bronchial epithelium ultrastructure, dog: 1213
TOBACCO SMOKE, (Contd.)
  toxicity, lung, dog: 1215
TOBACCO SMOKING
  bronchus cancer, brothers: 1343
  inflammatory lung diseases, sputum cytology: 1210
  lung cancer: 1214,1246
    enzyme metabolism of alveolar macrophages: 1211
    Hiroshima and Nagasaki: 1176
    sputum cytology: 1210
  occupational asbestosis, Finland: 1208
  respiratory cancer, review: 1153,1161
  school children, Illinois: 1218
  toxicity, carciovascular, human: 1217
    respiratory, review: 1161
  urinary chemiluminescence and bladder cancer: 1221
TONGUE NEOPLASMS
  rare, classification: 1307
TOXICITY
  aflatoxins, animal: 1225
    exptl. and human, review: 1149
  cycasin and its aglycone, review: 1146
  fungi (from animal feeds or peanuts), rats and birds: 1229
  Fusarium nivale mycotoxin, mouse: 1184
  lasiocarpine, liver, effect of dietary lipotropes, pregnant and fetal rat: 1233
  pyrrolizidine alkaloids, exptl. and human, review: 1148
  radiomimetic toxin(s) of bracken fern (*Pteris aquilina*), exptl., review: 1147
  tobacco smoke, cardiovascular, human: 1217
    respiratory, dog: 1215
      review: 1161
TRYPTOPHAN
  complex formation with carcinogens: 1182

UREA, HYDROXY-
  effect on nucleic acids, normal tissues, mouse: 1195
    β-propiolactone skin tumors, mouse: 1195
URETHAN
  liver tumors, effect of hepatectomy, mouse: 1232
  lung tumors, effect of hepatectomy, mouse: 1232

VAGINA
  effect of hormones and carcinogens, mouse, review: 1150
VIRAL CARCINOGENESIS
  and cocarcinogens, mechanism of action, review: 1137
  DNA virus transformation, mechanism, review: 1128
  immunology, review: 1151
VIRUS
  herpes simplex, infection of spleen and thymus, hamster: 1247
  Lucké frog adenocarcinoma, comparison to Burkitt lymphoma virus: 1261

VIRUS, ADENO-
  strain 12, effect of adeno-associated virus, hamster: 1248
  transformation, mechanism, review: 1128
  type 31 properties of hemagglutinin: 1249
VIRUS, LEUKEMIA/LYMPHOMA
  AKR (mouse), effect of interferon: 1250
  avian
    erythroleukemia (chicken), radiation effects *in vivo*: 1171
    leukosis, human leukemia: 1262
      multiplication, endocrine organs, chicken: 1263
    myeloblastosis, transformation of malignant cells *in vitro*: 1264
    ocular leukosis, pathology: 1265
  bovine
    leukosis, properties: 1266
    lymphosarcoma, isolation and properties: 1274
    reticulosis, pathogenicity, mouse: 1267
  Burkitt lymphoma (herpes-like)
    cell karyotype: 1260
    comparison to Lucké frog adenocarcinoma virus: 1261
    isolation, methods: 1259
    possible interaction with malaria, review: 1156
  Friend (mouse)
    polycythemia-inducing strain, effect on erythropoiesis, mouse: 1254
    RNA structure: 1253
  Gross (mouse), rat cell lines, tumor induction, rat: 1258
  human, EB-containing cell lines, karyotype: 1260
VIRUS, LEUKEMIA/LYMPHOMA, (Contd.)
  New Zealand Black mice, review: 1129
  passage A, transmission, mouse: 1251
  radiation-induced thymoma, tumor karyotype, mouse: 1170
  Rauscher (mouse)
    effect on erythropoiesis: 1255
      platelets: 1256
    RNA structure: 1257
  Rich (mouse), distribution, thymus: 1252
VIRUS, MAMMARY TUMOR
  antibodies, mouse, rabbit and monkey: 1278
  cell line, morphology, mouse: 1277
  particles resembling, human breast cancer: 1276
VIRUS, PAPOVA (papilloma-polyoma-vacuolating)
  polyoma, salivary gland tumors, ultrastructure, mouse: 1281
  SV40
    antibodies, human cancer, India: 1279
    surface and transplantation antigens, transformed cells: 1283
    transformed mouse cell line: 1280
    transplantation immunity, effect of antiserum, hamster: 1282
  transformation, mechanism, review: 1128
VIRUS, SARCOMA
  Moloney (mouse), dose-response relationships: 1275
  Rous (chicken)
    antibodies, human leukemia: 1262
    RNA structure: 1257

WATER
  pollution (oil), esophagus cancer, Curacao: 1223

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

If you do not desire to continue receiving this publication, please **CHECK HERE** ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

616.99405
CAR

Vet. Med.

[illegible] LIBRARY

JULY 1969
Abstract Nos. 1350-1652

Vol. 7
No. 7

SEP 9, 1969

[illegible]
OCT 2 7 [illegible]
LIBRARY

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

CARCINOGENESIS ABSTRACTS

Volume 7, Number 7
July, 1969

(Submitted for Publication
April, 1969)

Abstract Numbers

1350-1652

CONTENTS

	Page
Review	287
Physical Carcinogenesis	289
Chemical Carcinogenesis	293
Viral Carcinogenesis	308
Epidemiology and Biometry	327
Miscellaneous	331
Author Index	i
Subject Index	v

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 26, 1967.

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a na- ional program of cooperative research in cancer, is establishing a means whereby information n the field of carcinogenesis will be coordinated and made available. The information to be ncluded will be obtained from the National Cancer Institute, other governmental agencies, and on-governmental research institutions.

The issuing of Carcinogenesis Abstracts under the auspices of the National Cancer Insti- ute will provide a central source for current abstracting of the carcinogenesis literature be- ng published throughout the world. This will help facilitate an integrated and cooperative rogram of investigation in this area. The growing number of publications in the area of car- inogenesis makes imperative the availability of an appropriate abstracting service so that in- estigators may be apprised of progress with a minimum of delay. It is our desire to provide he investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most ecently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by Index Medicus. f the journal is not covered by Index Medicus, then the abbreviations (with some modifications) ound in World Medical Periodicals, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

dmin.	administered, administration	mg	milligram(s)
v.	average	min.	minute(s)
	curie(s)	ml	milliliter(s)
mC	millicurie(s)	mm	millimeter(s)
C	microcurie(s)	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
onc.	concentration	NIH	National Institutes of Health, USA
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	QO_2	oxygen quotient
DNase	deoxyribonuclease	PFU	plaque forming unit
e.g.	for example	ppm	parts per million
FFU	focus forming unit	pt.(s)	patient(s)
g.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
g	gram(s)	RES	reticuloendothelial system
µg	microgram(s)	resp.	respectively
Hb	hemoglobin	RNA	ribonucleic acid
i.a.	intra-arterial	RNase	ribonuclease
ID_{50}	median infectious dose	soln.	solution
inj.	injected, injection(s)	s.c.	subcutaneous
inoc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
i.p.	intraperitoneal	x	times (e.g. x 3/wk.)
I.U.	international unit(s)	U	unit
i.v.	intravenous	UV	ultraviolet
kg	kilogram(s)	vol.	volume
LD_{50}	median lethal dose	VA	Veterans Administration
M	molar, mole(s)	wt.	weight
mM	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
µM	micromole(s)		
max.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

Af.	Afrikaans	E.	English	Hun.	Hungarian	Lith.	Lithuanian	Ser.	Serbo-Croatian
Ar.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
Bul.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
Ch.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
Cz.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
Dan.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
Dut.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

69-1350 The Chemotherapy of Cancer. (E.) Issekutz, B. Budapest, Publishing House, 1969, 219 pp., $8.40. (About 1100 references)

Chapter 1 (pp. 15-25) discusses the morphological and biochemical abnormalities present which confer the properties of a parasite on the tumor cell; it is concluded that tumor cells are "parasitic" to the host only within very narrow limits. Chapter 4 (pp. 46-56) discusses tumor-inducing viruses and related problems of cancer immunity, with particular reference to attempts to enhance the host's immune defense system.

69-1351 EARLY CELLULAR INFLAMMATION AND NEOPLASIA CONTROL. (E.) Stone, O. J. (U. Texas Med. Br., Galveston). Texas Rep. Biol. Med. 26(3):267-272, 1968. (41 references)

Evidence is presented to support the hypothesis that if the body has a normal defense mechanism against cancer, it might require the participation of the inflammatory response. Factors enhancing the early phases of cellular inflammation (which is present in such diseases as psoriasis) might benefit the tumor-bearing host, whereas factors depressing this early stage of immunity (such as tar and arsenic, which have both carcinogenic and tumor-inhibitory properties) might adversely affect the host.

69-1352 ENDOCRINE FACTORS IN THE PATHOGENESIS OF PLASMA CELL TUMORS. (E.) Hollander, V. P. (Hosp. Joint Dis. Med. Ctr., New York, N. Y.), K. Takakura and H. Yamada. Recent Progr. Hormone Res. 24:81-137, 1968. (111 references)

In an attempt to explain the marked male predominance in human plasmacytoma and multiple myeloma, the authors' previously published studies concerning the effects of sex and sex hormones, corticosteroids, growth hormone, prolactin and pituitary glycoprotein hormones (ACTH, FSH, LH, TSH) on mineral oil-induced plasma cell tumors in BALB/c mice are extensively discussed. A theoretical model of the interactions between hormones and plasma cells is presented.

69-1353 ADENOVIRUSES: THE NATURE OF THE VIRION AND OF CONTROLLING FACTORS IN PRODUCTIVE OR ABORTIVE INFECTION AND TUMORIGENESIS. (E.) Schlesinger, R. W. (Rutgers Med. Sch., New Brunswick, N. J.). Advances Virus Res. 14:1-61, 1969. (241 references)

The importance of the host cell genotype in determining the tumor-inducing capacities of human adenoviruses is discussed. It is suggested that the frequency of tumor induction or malignant transformation (in hamsters and some other rodents) by any given serotype of adenovirus, is governed by the extent to which a given host system will favor the survival of abortively infected cells, thereby permitting the expression of the tumor-inducing trait.

69-1354 NUCLEIC ACIDS OF TUMOR VIRUSES. (E.) Crawford, L. V. (U. Glasgow, Scotland). Advances Virus Res. 14:89-152, 1969. (197 references)

The physical, chemical and structural properties of nucleic acids from tumor viruses containing RNA (avian leukosis, mouse leukosis-sarcoma and mammary tumor virus) and DNA (adenovirus, papilloma, polyoma, SV40, and some poxviruses and herpes-like viruses), and the mechanism(s) of transformation of host cells by the DNA viruses, are discussed.

69-1355 SOME ASPECTS OF THE INTERACTION BETWEEN POLYOMA VIRUS AND CELL DNA. (E.) Winocour, E. (Weizmann Inst. Sci., Rehovoth, Israel). Advances Virus Res. 14:153-200, 1969. (97 references)

Subjects discussed include the effects of polyoma virus (PV) on the control of cellular DNA synthesis, the encapsidation of cellular DNA within PV particles, and the question of base sequence homology between the 20S DNA of PV and the DNA of normal cells.

69-1356 HISTOGENESIS OF HEPATIC CARCINOMAS. THE SPECIFIC FETOPROTEINS. (Fr.) Lacassagne, A. (Inst. Radium, Paris). Bull. Cancer (Paris) 55(2):181-204, 1968. (82 references)

The disputed theories concerning the embryonic development of the liver, the origins of different types of liver tumors, and the origins and natures of cells participating in liver regeneration (especially after bile duct ligation, chronic infection or admin. of hepatotoxic substances) are discussed. The almost constant presence of specific fetoproteins, only in adults (animals or human pts.) with liver carcinoma, is described as supporting the hypothesis that tumor cell clones, arising suddenly and belatedly during chronic poisoning by hepatocarcinogens, develop from embryonic stem elements.

69-1357 PROBLEM OF THE VIRUS ETIOLOGY OF UNDIFFERENTIATED CELL LEUKEMIAS OF CHILDHOOD. (Ger.) Ambs, E. (U. Child. Clin., Wurzburg, Germany). Folia Haemat. (Leipzig) 90(1):1-30, 1968. (185 references)

After an extensive discussion of the virus-induced leukemias in animals and the epidemiology of the childhood leukemias, it is concluded that, in spite of many promising results, absolute proof of a viral etiology of human leukemias is lacking.

69-1358 VIRUSES, POLYMORPHONUCLEAR LEUKOCYTES AND NEOPLASIA. A NEW DIAGNOSTIC-PROGNOSTIC APPROACH TO MALIGNANCY. (E.) Di Virgilio, G. (Columbia U. Coll. Phys. Surgs., New York, N. Y.), N. Lavenda, F. Infante and P. Paul. Cancer Cyt. 8(1):23-41, 1968. (20 references)

Results of previously published studies are discussed. Intracytoplasmic viral elements of indistinguishable appearance and distribution were found in the polymorphonuclear WBC of over 600 pts. with a wide variety of benign and malignant tumors, and of over 600 pts. with virus diseases. The lattice-like network (representing a sequential, orderly arrangement of the viral particles) observed in the plasmas of the pts. with virus diseases, however, was consistently absent from plasmas from the cancer pts. It is suggested that the consistent correlation between the appearance of infected polymorphonuclear WBC in the peripheral circulation, and the absence of this immunological serum-virus complex, may serve as a basis for a diagnostic-prognostic test for malignancy.

69-1359 MECHANISM OF TUMOR INDUCTION FROM THE IMMUNOLOGICAL POINT OF VIEW. (Jap.) Kitagawa, M. (U. Osaka, Japan). Saishin Igaku 23(3):438-444, 1968. (27 references)

69-1360 AIR POLLUTION AND LUNG CANCER. (Jap.) Wada, S. and S. Kambe. Gan no Rinsho (Jap. J. Cancer Clin.) 14(11):916-921, 1968. (49 references)

69-1361 IRREVERSIBLE CHANGES AND TUMORS INDUCED BY STEROID HORMONES IN THE MOUSE VAGINAL EPITHELIUM. (Jap.) Takasugi, N. (U. Tokyo). Saishin Igaku 23(3):522-531, 1968. (44 references)

69-1362 YAMAGIWA'S TAR CANCER AND ITS HISTORICAL SIGNIFICANCE - FROM PERCIVAL POTT TO KATSUSABURO YAMAGIWA. (E.) Henschen, F. (Karolinska Inst., Stockholm). Gann 59(6):447-451, 1968. (No references)

69-1363 TUMOR FORMATION AND BIOLOGICAL MACROMOLECULES. (Jap.) Endo, H. (U. Kyushu, Hakata, Japan), T. Kada, N. Naora, I. Watanabe, T. Takashi and M. Kitagawa. Saishin Igaku 23(3):445-453. 1968. (No references)

69-1364 The Virology and Immunology of Cancer. (E.) Zilber, L. A. and G. I. Abelev (R. Schachter, Trans. & Ed.). Oxford, Pergamon Press, 1968, 474 pp. (About 1400 references)

69-1365 MORPHOLOGY OF TUMOR VIRUSES, PARTICULARLY TYPE A PARTICLES OF MOUSE TUMORS. (Jap.) Sendo, F. (U. Hokkaido, Sapporo, Japan), T. Kodama and H. Kobayashi. Saishin Igaku 23(3):623-630, 1968. (45 references)

69-1366 STATISTICAL TESTING OF A DEEP MATHEMATICAL MODEL FOR HUMAN BREAST CANCER. (E.) Bross, I. D. J. (Roswell Park Mem. Inst., Buffalo, N. Y.) and L. E. Blumenson. J. Chron. Dis. 21(7):493-506, 1968. (12 references)

69-1367 CELL POPULATION KINETICS IN NORMAL AND MALIGNANT TISSUES. (E.) Lamerton, L. F. (Inst. Cancer Res., Belmont, Sutton, England) and G. G. Steel. Progr. Biophys. 18: 245-283, 1968. (162 references)

69-1368 MALIGNANT EPITHELIAL TUMORS IN DEEP-SEA FISHERMEN. (Sp.) Cabre, J. (Fac. Med. Cádiz, Spain) and J. Lasanta. Actas Dermosif. (Madrid) 59(5-6):361-364, 1968.

Malignant skin tumors were found in 95/563 men employed as deep-sea fishermen or dock workers on fishing wharves, including 83 spinocellular carcinomas of the lower lip (38), cheek (18), external ear (6), tongue (5), hand (5), foot (2), forehead (2), chin (2), gum, neck, dorsal surface of the nose, scrotum, and perianal region (1 case each), and 12 basal cell carcinomas of the nose (6) and eyelid (6). The over-all incidence in fishermen and dock workers was 170/1000 persons, compared to 71/1000 in the local population as a whole (University of Cadiz hospital records). In all instances, the tumors had developed in areas already showing characteristic skin changes or precancerous lesions ("mariner's skin" or senile keratoma), in the presence of chronic local irritation or repeated microtraumas, justifying the classification of skin cancer as a specific occupational hazard for these 2 groups of men.

69-1369 XERODERMA PIGMENTOSUM. CLINICAL AND LABORATORY INVESTIGATION OF ITS BASIC DEFECT. (E.) Reed, W. B. (1013 W. Olive Ave., Burbank, Calif.), B. Landing, G. Sugarman, J. E. Cleaver and J. Melnyk. JAMA 207(11):2073-2079, 1969.

Five pts. with xeroderma pigmentosum (XP), who had begun to develop skin tumors (mostly squamous cell carcinomas of the face) before the age of 5 yr., are described. The 4 youngest pts. comprised 2 sibling pairs (ages 5 and 8 yr. in 1 pair; 14 and 16 yr. in 2 Japanese siblings) with XP and CNS manifestations (the DeSanctis-Cacchione syndrome; 1 autopsied pt. showed cerebral and olivopontocerebellar atrophy). The youngest of these 4 pts. developed acute lymphatic leukemia (at age 3 yr.), and was the only pt. examined who showed chromosomal abnormalities in a lymphocyte culture (possibly related to antimetabolite therapy). The oldest pt. in this group (a 29-yr.-old man whose brother had died with XP) had CNS manifestations; his skin lesions had apparently become relatively inactive, although a squamous cell carcinoma had developed on a vaccination scar following solar exposure. Results of several tests suggested that the basic biochemical defect in XP is a mutation-induced absence or reduction of repair replication of DNA in the skin fibroblasts, which may be related to solar carcinogenesis in exposed areas of the skin.

69-1370 CANCER OF THE ESOPHAGUS IN POST-BURN SCAR STENOSIS. (Rus.) Sytnik, A. P. (Sklifosovskii Inst. Emerg. Aid, Moscow) and B. A. Petrov. Khirurgiia (Moskva) 44(11):3-9, 1968.

From 1953-1967, 9 women and 5 men (av. age 40 yr.) with malignant transformation of esophageal scars were seen. These pts. had all sustained chemical burns, 16-41 yr. (av. 26.5 yr.) before the diagnosis of cancer; at diagnosis, 11/14 had advanced cancer and only 3/14 were able to undergo resection. Dysphagia was an early symptom of malignant transformation. Because of the danger of malignant transformation of burn scars of the esophagus, widening of the indications for esophagoplasty is recommended (particularly when repeated bougienage is ineffective).

69-1371 TOXICITY OF INHALED $^{90}SrCl_2$ IN BEAGLE DOGS. II. (E.) U.S. AEC Lovelace Found. 39:1-13, 1968.

Single doses of $^{90}SrCl_2$ (initial body burdens, 2.6-280 µC/kg) were admin. by aerosol to 72 dogs; 24 were sacrificed for pathological examination and the other 48/72 were used in a longevity study. At the time of report, 11 dogs had died (or had been killed when moribund), 6/11 with severe blood dyscrasias (after 18-31 days), 1/11 with leukemia (after 585 days), 1/11 with an osteochondrosarcoma (after 1099 days), and 3/11 with angiosarcomas (after 928-1168 days) of the bones. The cumulative skeletal dosage (until death) was 3900 rads in the animal with leukemia, 11,000-18,000 rads in the animals with angiosarcoma or osteochondrosarcoma, and 670-1300 rads in the dogs with blood dyscrasias. At the time of report, 4 other animals were alive with signs of bone tumors (3/4; 1285 or 1286 days after treatment) or a mammary tumor (1/4; 1184 days after treatment). The dogs dying with angiosarcoma and osteochondrosarcoma also showed marked extramedullary hematopoiesis with granulocytic hyperplasia, although only 1/4 had extensive extramedullary metastases. It is suggested that these hematopoietic changes might have progressed to chronic granulocytic leukemia if the animals had not died from their primary tumors.

69-1372 TOXICITY OF INHALED $^{144}CeCl_3$ IN BEAGLE DOGS. II. (E.) U.S. AEC Lovelace Found. 39:14-25, 1968.

Aerosols of $^{144}CeCl_3$ (initial body burden, 2-700 µC/kg) were admin. to 82 dogs; 27 were sacrificed after 2-512 days (to study metabolism and dosimetry) and the other 55/82 were placed in a longevity study. The highest cumulative radiation dose was seen in the liver, followed by the lungs and the bones. At the time of report, 13 dogs in the 2 highest dosage groups had died (or had been killed when moribund), 8/13 with blood dyscrasias (21-44 days after treatment), 2/13 with pneumonitis (after 138-144 days), and 3/13 with liver necrosis (after 309-874 days; 1/3 also showed pancreatic necrosis); cumulative skeletal radiation doses (until death) in these

3 groups were 710-1300, 3000-5800, and 4400-5800 rads, resp. The radiation doses accumulated by the livers, lungs and bones of the surviving animals led to the expectation of tumors of these tissues and a reduced survival time in the remaining animals in the longevity study.

69-1373 TOXICITY OF INHALED $^{91}YCl_3$ IN BEAGLE DOGS. II. (E.) U.S. AEC Lovelace Found. 39:26-32, 1968.

Aerosols of $^{91}YCl_3$ (initial body burden, 73-1340 µC/kg) were admin. to 46 dogs; 4 were sacrificed for a metabolism and dosimetry study, the others were retained for a longevity study. After 17-33 days, 11 dogs of the highest dosage groups died (or were sacrificed when moribund) with severe bone marrow damage and pancytopenia; 2 other dogs died of convulsions, apparently unrelated to ^{91}Y exposure, 363 and 473 days after treatment. The other animals were still under observation at the time of report (data on hematological changes were obtained through 364 days after treatment).

69-1374 TOXICITY OF INHALED ^{144}Ce FUSED CLAY IN BEAGLE DOGS. (E.) U.S. AEC Lovelace Found. 39:33-53, 1968.

In dogs treated with ^{144}Ce in fused clay (by inhalation) and sacrificed after up to 128 days, distribution studies showed tenacious retention of ^{144}Ce in the lungs (88% of the body burden of ^{144}Ce was still in the lungs after 128 days). The quantity of ^{144}Ce translocated to the tracheobronchial lymph nodes, liver and bones was very small (although the conc. of ^{144}Ce in the small tracheobronchial lymph nodes was higher than the pulmonary conc. by day 100). Of 15 treated dogs in a longevity study, 8 died (or were sacrificed when moribund) after 143-257 days, showing severe radiation pneumonitis; the cumulative radiation dosages to the lungs in these animals and in the survivors (after up to 130 days) were 71,000-210,000 and 13,000-54,000 rads, resp. The only other abnormalities seen in the dogs dying with radiation pneumonitis were electrocardiographic abnormalities in 2/8. It is suggested that the animals surviving the development of pneumonitis may eventually develop lung tumors.

69-1375 TOXICITY OF $^{137}CsCl$ IN THE BEAGLE DOG. (E.) U.S. AEC Lovelace Found. 39:54-75, 1968.

The distribution of $^{137}CsCl$ in dogs was ubiquitous (throughout the body) after either i.v. admin. or inhalation. In a longevity study of 20 dogs treated i.v. with $^{137}CsCl$, 8/20 died after 22-33 days (6/8) or 77-81 days (2/8) of severe bone marrow depression and pancytopenia. The cumulative radiation dosages (whole body) in these animals and in the 12 survivors (60 days after treatment) were 830-1400 and 470-1400 rads, resp.

69-1376 STATUS OF LONGEVITY AND SACRIFICE EXPERIMENTS IN BEAGLE DOGS (SEPTEMBER 30, 1968). (E.) U.S. AEC Lovelace Found. 39:241-253, 1968.

Results (as of September 30, 1968) of the experiments described in the 5 preceding papers are presented in tabular form.

69-1377 TOXICITY OF INHALED ^{131}I IN RATS. (E.) U.S. AEC Lovelace Found. 39:76-83, 1968.

In several groups of Holtzman rats (160-240 g; both sexes) treated with ^{131}I (initial body burden 20-1100 µC/kg) i.v. or by aerosol, the metabolism and long-term effects of ^{131}I depended more on the dosage than on the route of admin. In the first 24 hr., 50-60% of the admin. dose was excreted; during this time after inhalation exposure, the ^{131}I content of all organs except thyroid and pelt decreased, while the thyroid content rose to at least 3.2% of the body burden. Long-term studies demonstrated no significant pathological changes in any organs except the thyroid and pituitary. Changes in these 2 organs were temporary and reversible in rats admin. less than about 160 µC/kg; above this dose, the changes were irreversible. At the higher doses, the incidence of thyroid tumors (usually follicular adenomas) and pituitary adenomas (seen in 16/55 admin. the higher doses) was about 3-fold higher than in untreated controls or rats admin. the lower ^{131}I doses. Tumors of the thyroid and (particularly) the pituitary appeared predominantly in rats at least 500 days old. No mammary tumors were noted in 5 rats with both pituitary and thyroid tumors.

69-1378 TOXICITY OF INHALED $^{144}CeO_2$ IN RATS. (E.) U.S. AEC Lovelace Found. 39:84-91, 1968.

Aerosols of $^{144}CeO_2$ were admin. to 2 groups of 4-mo.-old Holtzman rats; av. initial body burdens were about 3.0 µC/kg in 11 rats and 170 µC/kg in 23 rats. After an initial rapid clearance phase, ^{144}Ce showed an effective half-time of 100 days in the lung; 500 days after exposure, the cumulative radiation dose to the lung (based on the av. 14-day body burden) was 2500 rads. At the time of report, 20/34 rats had died. Pulmonary pathological signs observed in 17 rats of the high-dosage group (mean initial and 14-day body burdens were 180 and 21 µC/kg, resp.) are tabulated. Two of these rats died after 61-93 days with pulmonary edema or pneumonia. The other 15 rats died after 101-475 days (6/15 with pneumonia); 14/15 showed radiation fibrosis, sometimes associated with squamous metaplasia of the bronchi (9/14), initial thickening of the arteries (8/14), and squamous cell carcinoma (2/14; 2 others showed possible squamous cell carcinomas). One rat (dying after 210 days) showed pneumonia and squamous cell carcinoma, but no signs of radiation fibrosis. No radioactivity was detected in 1/3 of the histologically verified carcinomas. Because of early mortality from pneumonia, the low-dosage group did not serve as an adequate control for the longevity study.

69-1379 TOXICITY OF ^{90}Sr-^{90}Y IN CHINESE HAMSTERS. (E.) U.S. AEC Lovelace Found. 39:92-103/104, 1968.

Biological effects of ^{90}Sr-^{90}Y (0.2-5.0 μC/g i.p.; 1 group was treated with ^{85}Sr or ^{88}Y) were studied in several groups of Chinese hamsters (108 were sacrificed after 2-224 days, 80 were kept in a long-term observation group, 64 were admin. ^{85}Sr or ^{88}Y). In animals admin. 1 or 2 μC/g, deaths were related to bone marrow depletion, and survival curves (up to 270 days) depended on the total accumulated radiation dosage (which increased with the survival time after treatment). The number of chromosome breaks/cell observed in the bone marrow cells increased with the accumulated radiation dosage. Cell clones with abnormal karyotypes were seen in 2 animals treated with ^{90}Sr (1.0 μC/g) 113 days previously, but these cells may not have been functionally abnormal, and the clones were not necessarily related to premalignant conditions. At the time of report, 1 animal had developed an osteogenic sarcoma (with a high proportion of polyploid cells), 241 days after ^{90}Sr treatment (1.0 μC/g). An increased incidence of neoplasms, reflecting a postulated dose-related increase in submicroscopic abnormalities, is expected in the long-term survivors.

69-1380 EFFECT OF ZYMOSAN INJECTION ON BEHAVIOR OF INHALED PARTICLES IN RATS. (E.) U.S. AEC Lovelace Found. 39:129-135, 1968.

In albino rats inhaling ^{137}Cs on fused clay particles, following RES stimulation by a 6-day course of zymosan (Z; 10 mg/kg/day i.v.), initial clearance of the inhaled particles was increased 2-fold, by comparison to saline-treated controls. After a few days, however, clearance kinetics were the same in Z-treated and control rats. About 94% of the body content of ^{137}Cs was localized in the lungs. Increased numbers of RES cells (forming many circumscribed nodules) were seen in the lungs, liver, spleen and bronchial lymph nodes of the Z-treated rats. Autoradiography demonstrated bursts of radioactivity in the alveoli and on the bronchial mucosa during the first few days after ^{137}Cs inhalation, followed by an increase of activity in the interstitial tissue. No radioactivity was seen in the RES nodules or the thickened septal walls at any time.

69-1381 THE EFFECTS OF INHALATION OF $^{90}SrCl_2$ ON THE EXCRETION OF URINARY 17-KETOGENIC STEROIDS IN BEAGLE DOGS. (E.) U.S. AEC Lovelace Found. 39:222-224, 1968.

Urinary 17-ketogenic steroid (17-KS) excretion was studied in male and female dogs before and up to 24 mo. after inhalation of ^{90}Sr (av. initial doses, 4-87 μC/kg). Females showed significantly higher 17-KS excretion than males, but no significant changes in 17-KS excretion could be related to ^{90}Sr inhalation at any time period studied (marked variations were seen among individuals and among the dosage groups).

69-1382 PULMONARY LAVAGE AS A THERAPEUTIC MEASURE FOR REMOVING INHALED ^{95}Zr-^{95}Nb OXIDE FROM THE LUNG. (E.) U.S. AEC Lovelace Found. 39:207-216, 1968.

In dogs inhaling ^{95}Zr-^{95}Nb oxide (10 min. of inhalation, rhinarium only), the initial lung burden (determined by profile scanning) in animals undergoing pulmonary lavage (with tonic saline) was reduced by 12-28% (on day 30 after exposure), depending on the time of lavage; best results were seen in animals undergoing lavage on days 0, 8 and 16 after exposure. In controls, the initial lung burden decreased by 5% during this time. At 30 days, over 98% of the total radioactivity remained in the lungs. Pulmonary lavage also enhanced the clearance of the isotope from the lungs via the bronchial lymph nodes.

69-1383 EFFECT OF AGE, STRAIN, AND WHOLE-BODY X-IRRADIATION ON TRANSPLANTABILITY OF ^{90}Sr INDUCED CHLOROLEUKEMIA IN RATS. (E.) U.S. AEC Lovelace Found. 39:217-221, 1968.

In Sprague-Dawley rats inoc. i.p. with cells from a ^{90}Sr-induced, Holtzman-derived chloroleukemia, the tumor take (as determined by transplantability studies) decreased with increasing age at the time of tumor inoc., from 75% at age 7 days to 7% at age 28 days, with a corresponding increase in the mean survival time. This age-related reduction in tumor take was not seen in Holtzman rats (tumor takes were 95-100%). In Sprague-Dawley rats treated with ^{60}Co irradiation at age 27 days and inoc. with the leukemia at age 28 days, the tumor take (as of 72 days after tumor inoc.) was 34% at the highest radiation dose (400 rads), but doses of 100 or 200 rads did not increase tumor transplantability. Irradiation did not reduce tumor cell viability in Holtzman rats; tumor takes in irradiated rats inoc. at ages 7 and 28 days were 100% and 91%, resp. The results suggested a radiation-sensitive host-versus-tumor response in Sprague-Dawley rats, but the nature of the sensitizing antigen (strain- or tumor-specific) was not known.

69-1384 FACILITIES FOR SCANNING AND WHOLE-BODY COUNTING MAN AND EXPERIMENTAL ANIMALS. (E.) U.S. AEC Lovelace Found. 39:151-155, 1968.

Instruments used for dogs and man are described.

69-1385 USE OF METAPHASE CHROMOSOMES OF LIVER FOR ASSESSING RADIATION DAMAGE. (E.) U.S. AEC Lovelace Found. 39:174-178, 1968.

In regenerating liver cells of Chinese hamsters, the mitotic index reached a peak 54 hr. after partial hepatectomy (at the time of sacrifice). Regenerating liver cells from animals exposed to ^{60}Co irradiation (150 r) at 1, 24 or 48 hr. after partial hepatectomy, showed patterns of chromosomal aberrations suggesting that the cells were in the G-0 and G-1 stages of mitosis after 1 and 24 hr., and the G-2 and S stages after 48 hr.

69-1386 LANTHANUM DISTRIBUTION KINETICS AND RADIATION DOSE FOLLOWING ADMINISTRATION OF ^{140}La BY INHALATION, GAVAGE AND INJECTION. (E.) U.S. AEC Lovelace Found. 39:105-114, 1968.

69-1387 TISSUE DISTRIBUTION, EXCRETION, AND DOSIMETRY OF ^{95}Nb IN THE BEAGLE DOG AFTER INHALATION OF ^{95}Nb(V) OXALATE AND ^{95}Nb(V) OXIDE. (E.) U.S. AEC Lovelace Found. 39:115-121, 1968.

69-1388 RADIOIODINE METABOLISM IN THE BEAGLE DOG - THE IMPORTANCE OF AGE AND MODE OF ^{131}I EXPOSURE. (E.) U.S. AEC Lovelace Found. 39:122-125, 1968.

69-1389 RETENTION OF ^{137}Cs ENTRAPPED IN FUSED-CLAY PARTICLES FOLLOWING INHALATION BY RATS. (E.) U.S. AEC Lovelace Found. 39:126-128, 1968.

69-1390 EFFECT OF STABLE YTTRIUM CARRIER CONCENTRATION ON THE METABOLISM OF INHALED RADIOYTTRIUM IN RATS. (E.) U.S. AEC Lovelace Found. 39:136-141, 1968.

69-1391 THE INFLUENCE OF CHEMICAL STATE OF ^{144}Ce ON ITS METABOLISM FOLLOWING INHALATION BY MICE. (E.) U.S. AEC Lovelace Found. 39:142-147, 1968.

69-1392 THE METABOLISM OF INHALED $^{241}AmO_2$ IN BEAGLE DOGS. (E.) U.S. AEC Lovelace Found. 39:148-150, 1968.

69-1393 COLLOID FILTRATION AS A PREPARATIVE METHOD FOR RADIOANALYSIS OF BIOLOGICAL SAMPLES. (E.) U.S. AEC Lovelace Found. 39:156-164, 1968.

69-1394 ANALYSIS OF CASCADE IMPACTOR DATA BY A WEIGHTED LEAST SQUARES METHOD. (E.) U.S. AEC Lovelace Found. 39:165-171, 1968.

69-1395 RETENTION OF CESIUM-137 AND STRONTIUM-90 ADMINISTERED IN LETHAL DOSES TO RATS. (E.) Thomas, R. G. (Lovelace Found. Med. Ed. Res., Albuquerque, N. M.), R. L. Thomas and S. R. Wright. Amer. Industr. Hyg. Ass. J. 29(6):593-600, 1968.

69-1396 FURTHER STUDIES ON THE COMPARATIVE EFFECTS OF DIET ON INCIDENCE OF TUMORS IN MICE EXPOSED TO MULTIPLE SUBLETHAL DOSES OF TOTAL BODY X-IRRADIATION. (E.) Field, J. B. (U. Southern California, Los Angeles), G. S. Bajwa, L. A. Bavetta and B. H. Ershoff. Proc. Amer. Ass. Cancer Res. 10:25, 1969.

69-1397 CASE OF ERYTHROMYELOSIS OF PROBABLE RADIATION PATHOGENESIS. (Rus.) Shustov, V. Ia. (Saratov Med. Inst., USSR). Vrach. Delo (10):5-8, 1968.

See also abstract nos.: 1459,1460,1498

69-1398 DETERMINATION OF 1,2-BENZANTHRACENE IN WASTE WATER FROM PETROCHEMICAL PLANTS. (Rus.) Ershova, K. P. (Sysin Inst. Gen. Com. Hyg., Moscow) and I. M. Mints. *Gig. Sanit.* 33(9):52-55, 1968.

A method involving extraction with organic solvents, thin-layer chromatography and fluorescent spectroscopy (at the temperature of liquid nitrogen) is described. This method detected conc. of 1,2-benzanthracene as low as 0.25 μg/ml.

69-1399 AIR POLLUTION BY 3,4-BENZPYRENE IN THE VICINITY OF PETROCHEMICAL PLANTS. (Rus.) Samoilovich, L. N. (City San. Epidem. Stat., Grozny, USSR) and Iu. R. Red'kin. *Gig. Sanit.* 33(9):10-14, 1968.

Air samples were collected on filters and the filters were extracted with benzene; after evaporation of the benzene, the dry extract was dissolved in n-octane. The 3,4-benzpyrene (BP) conc. was determined by fluorescent spectroscopy at -196°C; preliminary chromatographic fractionation of the extract could be omitted by quantitative analysis of BP according to the intensity of its fluorescence at 4030 Å. The BP conc. in air samples collected in various areas around the Grozny petrochemical plant was 0.1-400 μg/100 m^3 air; the highest levels were seen in samples collected near the areas where petroleum products were processed at high temperatures.

69-1400 THE RATE OF BREAKDOWN OF METHYL METHANESULPHONATE, DIMETHYL SULPHATE AND N-METHYL-N-NITROSOUREA IN THE RAT. (E.) Swann, P. F. (Med. Res. Coun., Carshalton, England). *Biochem. J.* 110(1):49-52, 1968.

Rates of decomposition of methyl methanesulfonate (MMS; 100 mg/kg i.v.), dimethyl sulfate (DMS; 75 mg/kg i.v.) and N-methyl-N-nitrosourea (MNU; 100 mg/kg i.v. or p.o.) were studied in rats. DMS was no longer detectable in the blood 3 min. after i.v. inj.; MMS was present in very low conc. in the blood 1.5 hr. after i.v. inj. MNU disappeared from the blood 15 min. after i.v. admin. Exhalation of $^{14}CO_2$ after p.o. admin. of ^{14}C-labeled MNU was slower than after i.v. admin. of the same dosage. The estimated lifetime of MNU in the rat was 2-3 hr.

69-1401 AN INVESTIGATION OF POSSIBLE TRANSFER OF S-METHYL GROUPS TO THE AMINO NITROGEN OF AMINOAZO DYES. (E.) Blunck, J. M. (U. Melbourne, Australia) and P. E. Hughes. *Oncology (Basel)* 22(2-3):118-128, 1968.

In male Wistar rats inj. i.p. with either 3'- or 2-methyl-4-dimethylaminoazobenzene (1 ml/100 g of 2% soln. in corn oil), followed by inj. of ^{14}C-labeled methyl methionine (125 μC i.p.) 20 hr. later, analysis of the protein-bound dyes formed showed no evidence of transfer of the S-methyl groups of methionine to the aminoazo dye moiety of the protein-bound dye.

69-1402 MUTATIONS AND DECREASES IN DENSITY OF TRANSFORMING DNA PRODUCED BY DERIVATIVES OF THE CARCINOGENS 2-ACETYLAMINOFLUORENE AND N-METHYL-4-AMINOAZOBENZENE. (E.) Maher, V. M. (U. Wisconsin, Madison), E. C. Miller, J. A. Miller and W. Szybalski. *Molec. Pharmacol.* 4(5):411-426, 1968.

Interactions between biologically active DNA (from *Bacillus subtilis*) and several metabolites and derivatives of 2-acetylaminofluorene (AAF) or N-methyl-4-aminoazobenzene (MAB) were studied (pH 7.5, room temperature). The results demonstrated a good correlation between *in vivo* carcinogenic activity (especially at the site of s.c. inj. in rats) and reactivity and mutagenicity for transforming DNA. The most active compounds in both respects were N-acetoxy-AAF, N-benzoyloxy-AAF and N-benzoyloxy-MAB. The decreases in buoyant density seen in DNA's treated with active compounds of the AAF series were directly proportional to the frequencies of induced mutations, and to the number of fluorene molecules bound covalently to the DNA.

69-1403 THE INTERACTION OF CHEMICAL CARCINOGENS AND CELLS *IN VITRO*. (E.) Diamond, L. (Wistar Inst. Anat. Biol., Philadelphia, Pa.). *Progr. Exp. Tumor Res.* 11:364-383, 1969.

No strict correlation between resistance to the growth-inhibitory effect of several polycyclic hydrocarbons and the neoplastic state was observed in monolayers of normal, transformed or malignant rodent cells. Responses of sensitive and resistant cells were not related to carcinogen uptake, but to the amount of carcinogen bound to the cells; resistant cells had a lower binding capacity than sensitive cells. Normal cells showed significant binding of 7,12-dimethylbenzanthracene to nucleic acids and protein, the highest specific activity being obtained with DNA. Neither *in vivo* nor *in vitro* experiments have so far shown the mechanism of the carcinogenic or cytotoxic effect of the polycyclic hydrocarbons. Transformation assays in dispersed cell populations offer the best possibility for distinguishing the qualitative and quantitative differences in cell-carcinogen interactions leading to inhibition or stimulation of cell growth. The ideal system may be found in primary cell populations which are resistant to cytotoxicity.

69-1404 SEGREGATION OF THE NUCLEOLAR MATERIALS PRODUCED BY QUINOXALINE ANTIBIOTICS

IN JTC-13 CELLS - COMPARISON OF EFFECTS AMONG 4-NITROQUINOLINE 1-OXIDE, ACTINOMYCIN-B, AND QUINOXALINE ANTIBIOTICS. (E.) Harada, Y. (Shionogi & Co., Ltd., Osaka, Japan), N. Sunagawa and K. Katagiri. *Gann* 59(6):513-522, 1968.

Nucleolar ultrastructure was studied in the JTC-13 line of mouse lymphosarcoma cells, after 4 hr. of exposure to 4-nitroquinoline 1-oxide (NQO), actinomycin B (AB) and 2 quinoxaline antibiotics (all at 0.1-10 μg/ml). The results suggested that NQO acted indirectly on nucleolar RNA synthesis by disturbing cytoplasmic metabolism, whereas AB had a direct effect on nucleolar RNA. The quinoxaline antibiotics had the same mechanism of action as AB; quinomycin A was as active as AB at the same conc., but triostin C had only 10% of the activity of AB.

69-1405 CYCASIN: DETECTION OF ASSOCIATED MUTAGENIC ACTIVITY *IN VIVO*. (E.) Gabridge, M. G. (Food Drug Admin., HEW, Washington, D.C.), A. Denunzio and M. S. Legator. *Science* 163(3868):689-691, 1969.

In a "host mediated" assay system in male Swiss mice, cycasin (C) and its aglycone (methylazoxymethanol) increased the mutant frequency of *Salmonella typhimurium* histidine auxotrophs. The degree of C-related mutagenic activity depended on the enzymatic deglucosylation of C (to C aglycone) by the normal intestinal flora, a process which was inhibited by reduction of the intestinal flora by ampicillin treatment.

69-1406 REACTIVITY OF THE DIACETYL DERIVATIVE OF THE CARCINOGEN 4-HYDROXYAMINOQUINOLINE-1-OXIDE WITH DNA, RNA, AND OTHER NUCLEOPHILES. (E.) Enomoto, M. (U. Wisconsin Med. Ctr., Madison), K. Sato, E. C. Miller and J. A. Miller. *Life Sci*. 7(20, Pt.2):1025-1032, 1968.

At neutral pH and under anaerobic conditions, 4-hydroxyaminoquinoline-1-oxide (HAQO) showed little or no non-enzymatic reactivity with DNA, RNA, polyribonucleotides or methionine in cell-free systems. The diacetyl derivative of HAQO, however, reacted non-enzymatically with DNA, RNA, methionine and certain polyribonucleotides (especially polyguanylic acid), forming derivatives with fluorescent properties resembling those reported for the nucleic acid derivatives formed from HAQO *in vivo*. It is suggested that the *in vivo* reactivity of HAQO may depend on its esterification, although preliminary studies in rats showed that the diacetyl derivative was a less potent s.c. carcinogen than HAQO itself.

69-1407 EFFECT OF SOME MUTAGENIC VIROGENS AND CARCINOGENS ON DEOXYRIBONUCLEIC ACID. (E.) Yamafuji, K. (Kyushu U., Fukuoka, Japan) and Y. Uchida. *Enzymologia* 35(3):131-138, 1968.

Several mutagenic virogens liberated a previrus from silkworm DNA and enhanced the susceptibility of calf thymus DNA to DNase. Exposure to carcinogens (3,4-benzpyrene or 3-methylcholanthrene) split the components of mouse liver DNA, particularly the components of high molecular wt. Sedimentation profiles of DNA from normal mouse liver or muscle showed 5 or 6 major peaks, 3 of which were of high molecular wt. (45S or over), whereas DNA from 3 mouse tumors (MH-134 hepatoma, NF sarcoma and a glioma) showed only 2 or 3 major peaks of low or medium molecular wt. Mitomycin C exposure resulted in a splitting of the high molecular wt. fraction of hepatoma DNA, but had little effect on this fraction of normal mouse liver DNA. The data were interpreted as supporting the hypothesis that splitting of the high molecular wt. fractions of DNA may be an important step in mutagenesis, virus production and carcinogenesis.

69-1408 PEROXIDE INDUCED BINDING OF HYDROCARBONS TO DNA. (E.) Morreal, C. E. (Roswell Park Mem. Inst., Buffalo, N. Y.), T. L. Dao, K. Eskins, C. L. King and J. Dienstag. *Biochim. Biophys. Acta* 169(1):224-229, 1968.

Exposure to a dilute soln. of hydrogen peroxide induced chemical linkages of 3,4-benzpyrene, 3-methylcholanthrene, and 7,12-dimethylbenzanthracene to calf thymus DNA. These covalent-type DNA-hydrocarbon compounds were characterized by gradient centrifugation, hydrolysis to the nucleosides, and paper chromatography.

60-1409 STUDIES ON TUMOR INDUCTION IN RATS WITH 7,12-DIMETHYLBENZ(a)ANTHRACENE, WITH SPECIAL REFERENCES TO THE MORPHOGENESIS AND FINE-STRUCTURAL CHANGES IN THE TARGET ORGANS. (E.) Fukunishi, R. (Kagoshima U. Sch. Med., Japan). *Acta Path. Jap*. 18(1):51-72, 1968.

Rats of 2 strains were treated with 4 doses of 7,12-dimethylbenzanthracene (DMBA; 25 mg/kg/dose i.v.) at ages 50, 64, 78 and 92 days; the tumor incidence was studied in rats surviving more than 60 days-12 mo. after the beginning of treatment. In female Donryu and ACI rats, the incidence of mammary adenocarcinoma was 84.6% and 89.5%, resp. (in males it was 4.6% and 6.3%, resp.); mammary fibroadenomas (the only benign tumors noted in this study) developed in 28.2% and 21.1%, resp., of the females (none of the males developed tumors of this type). The incidence of keratinizing squamous cell carcinoma of the ear duct in Donryu rats was 38.4% in females and 20.8% in males; in ACI rats, it was 26.3% and 87.5%, resp. In Donryu rats, the leukemia incidence was significantly higher in females than in males (46.2% and 8.3%, resp.), but no marked sex difference was apparent in ACI rats (31.6% and 25.0%, resp.). Electron microscopic examination showed structural discontinuities at the sites of malignant transformation in the ear duct glands and the spleen; the well-differentiated and undifferentiated mammary adenocarcinomas were also classifiable by their ultrastructures. The acute toxic effects of DMBA on the organs varied according to their susceptibility to DMBA. "DMBA-responding" organs, which could develop tumors, showed irreversible ultrastructural changes. "DMBA-metabolizing" organs (liver, kidney) showed reversible changes; the "DMBA-susceptible" adrenal showed irreversible toxic damage, but no adrenal tumors developed. "DMBA-refractory" organs (heart) showed no ultrastructural changes.

69-1410 NITROSAMINE-INDUCED CARCINOGENESIS. THE ALKYLATION OF NUCLEIC ACIDS OF THE RAT BY N-METHYL-N-NITROSOUREA, DIMETHYLNITROSAMINE, DIMETHYL SULPHATE AND METHYL METHANESULPHONATE. (E.) Swann, P. F. (Med. Res. Coun., Carshalton, England) and P. N. Magee. Biochem. J. 110(1):39-47, 1968.

Patterns of nucleic acid alkylation were measured (by the formation of 7-methylguanine) in the organs of rats admin. ^{14}C-labeled dimethylnitrosamine (DMN), N-methyl-N-nitrosourea (MNU), methyl methanesulfonate (MMS) and dimethyl sulfate (DMS). DMN and MNU methylated RNA to a greater extent than DNA. Levels of nucleic acid alkylation after DMN admin. were highest in the liver, kidney (about 10% of hepatic levels of alkylation) and lung. MNU alkylated nucleic acids to about the same levels in all tissues studied (levels of alkylation were about the same as in the kidneys of DMN-treated rats). Levels of nucleic acid alkylation with MMS were about the same as with MNU, but MMS affected DNA more than RNA. Levels of alkylation were much lower with DMS than with MNU, even at toxic doses; the highest levels of alkylation were seen in the brain. A good correlation was seen between the patterns of nucleic acid alkylation and the organ distribution of tumors after DMN or MNU admin., but the results did not show that alkylation of nucleic acids, or any other molecule, was the cause of the tumors. No correlation was seen between the amount of alkylation of DNA and the production of tumors.

69-1411 ESOPHAGEAL TUMORS INDUCED BY N-METHYL-N-NITROSOANILINE. (Rus.) Napalkov, N. P. (Petrov Res. Inst. Oncol. USSR Min. Pub. Health, Leningrad) and K. M. Pozharisskii. Vop. Onkol. 14(12):65-72, 1968.

In 42 white rats treated with N-methyl-N-nitrosoaniline by intraesophageal application (5-6 doses/wk. of 14 mg/kg; after 4-5 mo., 28 mg/kg/dose), the first changes noted in the esophagus were diffuse epithelial hyperplasia and acanthosis, followed by hyperkeratosis and parakeratosis, then by leukoplakia with papillomatosis. Polyp-like mucous outgrowths and papillomas later developed, and some of the papillomas became malignant. Benign lesions developed after 375-409 days of treatment (av. 390 days) and malignant tumors after 459-598 days (av. 538 days). All animals died after 61-598 days of treatment. Of 18/42 animals that died in the early stages of the experiment, before the first tumor was noted, 8/18 showed premalignant esophageal lesions (leukoplakia, leukokeratosis or polyposis). In the 24 long-term survivors, pathological changes included papillomas in 4/24 and malignant tumors in 11/24.

69-1412 CIRCULATORY DISTURBANCE IN THE PATHOGENESIS OF ADRENOCORTICAL NECROSIS INDUCED BY 7,12-DIMETHYLBENZ(a)ANTHRACENE. (E.) Horváth, E. (Med. U., Szeged, Hungary), L. Csernay and K. Kovács. Exp. Path. 2(5):315-325, 1968.

In female albino rats, the acute adrenocortical toxic effects of 1 dose of 7,12-dimethylbenzanthracene (DMBA; 50 mg p.o.) involved severe disturbances of the adrenal circulation. Severe vascular lesions (up to and sometimes including rupture of the capillary walls) always preceded the development of hemorrhage and necrosis; necrotic and histochemical changes appeared at about the same time, and were demonstrated only when vascular damage was already present. It is suggested that ischemia from capillary lesions is important in the pathogenesis of DMBA-induced adrenocortical necrosis.

69-1413 ADRENOCORTICOLYTIC ACTION OF 7,12-DIMETHYLBENZ(α)ANTHRACENE IN RATS. II. EFFECT OF ACUTE CCl_4 POISONING, PARTIAL HEPATECTOMY AND A STEATOGENIC DIET ON ADRENOCORTICAL SUSCEPTIBILITY TO THE TOXIC AGENT. (It.) Colafranceschi, M. (U. Florence, Italy) and P. Tosi. Arch. De Vecchi Anat. Pat. 50(3):681-695, 1967.

Female Sprague-Dawley rats were treated with 7,12-dimethylbenzanthracene (DMBA; 6.25-25.0 mg/100 g p.o.) after several types of treatment designed to reduce DMBA metabolism in the liver. Some rats died within 72 hr. and the others were sacrificed 72 hr. after DMBA admin. Adrenocortical necrosis was seen in 10/10 rats admin. the highest dose of DMBA; the incidence was 1/6 at 12.5 mg/100 g and 0/6 at 6.25 mg/100 g. Acute CCl_4 poisoning (0.33 ml i.p. of a 50% soln. in olive oil) prevented adrenal necrosis induced by the highest DMBA dosage; partial hepatectomy reduced the incidence to 3/10. No protection was seen in rats previously treated with a steatogenic diet; several possible reasons for this lack of protection are discussed.

69-1414 EXPERIMENTAL CARCINOGENESIS IN THE ADRENAL CORTEX. CYTOPATHOLOGY OF AN ADRENOCORTICAL TUMOR EXPERIMENTALLY INDUCED IN THE WHITE RAT (WISTAR). (Rum.) Simionescu, N.

(Acad. Rumanian People's Rep., Bucharest), M. Scherzer and A. Petrovici. Stud. Cercet. Endocr. 19(5):387-392, 1968.

In adult female Wistar rats, oophorectomy (oox.) combined with 60-day courses of ACTH and somatotropin induced adrenocortical adenomas of trabecular structure in 100% of the group. These tumors were hormonally inactive or hypoactive; biochemical tests showed blocked enzyme activity (specifically, glucose-6-phosphate dehydrogenase and 3β-hydroxysteroid dehydrogenase), indicating reduced progesterone synthesis. No adrenal tumors were induced in rats treated by unilateral adrenalectomy (alone or + ACTH), oox. alone, oox. + ACTH, oox. + ACTH + hexestrol, or ACTH + hexestrol; no adrenal tumors developed in untreated controls.

69-1415 SUPPRESSED ANTIBODY RESPONSE IN MICE TREATED WITH 3-METHYLCHOLANTHRENE AT BIRTH. (E.) Yasuhira, K. (Kyoto U., Japan). Bull. Chest Dis. Res. Inst. Kyoto U. 1(1-2):33-37, 1968.

CF-1 Swiss mice were treated with 3-methylcholanthrene (MC; 0.3-1.0 mg i.p. in mineral oil soln.) at age 1-8 days; 4-6 wk. later, treatment with antigen was begun (2-3 s.c. doses of egg albumin in Freund's adjuvant); the mice were sacrificed 15 or 21 days after the last antigen dose. MC-treated mice showed negligible serum precipitin titers at the end of the experiment; antibody suppression was especially marked in mice treated with MC neonatally. Some MC-treated mice died of the runting syndrome about 2 wk. after MC admin. In controls (admin. the antigen only), precipitin titers were significant at the end of the study. Neither treated nor control mice showed a reaction to tuberculoprotein. Mice showing marked immunosuppression also showed marked myeloblastic infiltration in the spleen and peritoneal cavity, which was believed to be a leukemoid reaction to the Freund's adjuvant (not MC-induced leukemia).

69-1416 SPINAL ANKYLOSIS IN OLD RHESUS MONKEYS. (E.) Sokoloff, L. (NIH, Bethesda, Md.), K. C. Snell and H. L. Stewart. Clin. Orthop. (61):285-293, 1968.

Two male rhesus monkeys, treated with 3-methylcholanthrene (MCA; 2 inj. of 0.1 mg + an unspecified dosage in a pellet, admin. into the gastric wall in 1/2; unspecified dosage in 1/2) at the approx. age of 18 mo., developed spinal ankylosis 17-18 yr. later. No tumors are mentioned for the animal admin. MCA by inj. and implantation into the gastric wall; the other animal developed bilateral kidney carcinomas with lung metastases. One female monkey, treated with MCA, showed no bone or joint changes 18 yr. later (no tumors are mentioned). Most of the paper is devoted to a discussion of the spinal changes noted in these monkeys and 3 untreated controls.

69-1417 A NOTE ON THE SEMI-QUANTITATIVE ESTIMATION OF AFLATOXIN M_1 IN LIQUID MILK BY THIN-LAYER CHROMATOGRAPHY. (E.) Roberts, B. A. (Min. Agric. Fish. Food, New Haw, Weybridge, England) and R. Allcroft. Food Cosmet. Toxic. 6(3):339-340, 1968.

The lowest intake of aflatoxin B_1 (AB) giving an identifiable amount of aflatoxin M_1 (AM) in the milk of a 500-kg cow was about 0.6-0.9 mg/day; the AM conc. (0.0003 μg/ml) at this intake level was at about the lower limit of identification with the authors' thin-layer chromatographic method. When the AM conc. in the sample was greater than the conc. permitting a good comparison with the standard soln. (0.002 μg AB in chloroform), the extract had to be diluted.

69-1418 OCCURRENCE OF DIETHYLNITROSAMINE IN SOME SAMPLES OF FOOD. (E.) Hedler, L. (U. Freiburg-Breisgau, Germany) and P. Marquardt. Food Cosmet. Toxic. 6(3):341-348, 1968.

A thin-layer chromatographic method for the qualitative determination of nitrosamines (NA) in foods is described. It was necessary to concentrate the food samples to obtain samples with detectable NA levels; the av. degree of conc. ranged from 250 times in cheese to 20,000 times in wheat plant (9/9), wheat grain (2/2), unheated flour (3/3), pasteurized milk (1/1), and cheese (2/2), and in 22/30 samples of heated (175°C) wheat; the heated wheat samples without detectable levels of NA were from the 1967 harvest.

69-1419 EFFECTS OF AFLATOXIN B_1 ON POLYSOMAL PROFILES AND RNA SYNTHESIS IN RAT LIVER. (E.) Roy, A. K. (U. Pittsburgh Sch. Med., Pa.). Biochim. Biophys. Acta 169(1):206-211, 1968.

Aflatoxin B_1 (AB) induced polysomal disaggregation in rat liver, and caused a dose-dependent inhibition of ^{14}C-orotic acid incorporation into liver RNA. At lower AB doses, ribosomal RNA species proved more sensitive to this inhibition than smaller RNA species. AB did not inhibit an in vitro RNA-synthesizing system containing RNA polymerase from rat testis. The results suggested that a metabolite of AB, not AB itself, is a binding inhibitor of DNA-dependent RNA synthesis.

69-1420 PHENOBARBITAL AND METHYLCHOLANTHRENE STIMULATION OF RAT LIVER CHROMATIN TEMPLATE ACTIVITY. (E.) Piper, W. N. (Purdue U., Lafayette, Ind.) and W. F. Bousquet. Biochem. Biophys. Res. Commun. 33(4):602-605, 1968.

In liver cells of rats treated with phenobarbital or 3-methylcholanthrene, the chromatin template activity for RNA synthesis was increased, but this difference in template activity was abolished when basic protein was removed from the chromatin preparation.

9-1421 EXPERIMENTAL DIETARY HEPATOMA IN RAINBOW TROUT. THE ROLE OF COTTONSEED MEALS ND OTHER DIETS. (E.) Ghittino, P. (Inst. Exp. ool. Piedmont Liguria, Turin, Italy), A. Provana nd M. L. Codegone. Cancro 20(5):515-536, 1967.

ry diets containing peanut meal contaminated ith aflatoxin B (AB; 0.360 ppm) induced hepaomas within 4-8 mo. in trout, while AB-free ottonseed meals had no effect after 12-24 mo. epatomas were induced in trouts on another diet ontaining no peanut or cottonseed meals, which as initially AB-free but had become positive uring storage. When the AB level in the diet as relatively low, the tumor incidence was not odified but tumor onset was delayed. Hepatomas ppeared with comparable incidence in a trout train known to be susceptible and in a upposedly resistant strain. The appearance of epatoma was preceded by the development of esions described as "aflatoxicosis." Cholangitis eveloped in all groups. Sterculia foetida oil eemed to be the principal factor of cottonseed il involved in the production of such inflammaory changes.

69-1422 IMMUNOLOGICAL ASPECTS OF CARCINOGENESIS. (E.) Deckers, C. (U. Louvain, Belgium). Progr. Exp. Tumor Res. 11:262-272, 1969.

The antigenic structures of normal rat liver and induced rat hepatomas were compared by immunodiffusion and immunoelectrophoresis, using specific immune sera of rabbit origin. The results demonstrated antigenic simplification and loss of antigens (mainly the tissue antigens) in the hepatomas, although specific tumor antigens were present in some hepatomas. Tumor antigens were present in the microsomal fraction. In rats pretreated with pooled microsomes from primary dimethylaminoazobenzene (DAB)-induced hepatomas, the hepatoma incidence after a 14-mo. course of DAB treatment was 34.7%. In rats pretreated with normal liver microsomes, the hepatoma incidence was about the same as in untreated controls (50.0% and 53.6%, resp.).

69-1423 DIFFERENTIAL EFFECT OF POLYCYCLIC HYDROCARBONS ON THE DEMETHYLATION OF THE CARCINOGEN DIMETHYLNITROSAMINE BY RAT TISSUES. (E.) Venkatesan, N. (Tulane U., New Orleans, La.), J. C. Arcos and M. F. Argus. Life Sci. 7(19, Pt.1):1111-1119, 1968.

Dimethylnitrosamine (DMN) demethylase activity in rat liver microsomes was inhibited by in vivo pretreatment with 3-methylcholanthrene (MC), but not by addition of MC together with DMN to the in vitro system, or by MC metabolized by the microsomes prior to the addition of DMN. In vivo pretreatment with MC and several other carcinogens (equimolar doses) inhibited hepatic DMN demethylase activity in direct proportion to molecular size (phananthrene, anthanthrene, 3,4-benzpyrene and MC, in increasing order of activity). MC pretreatment also significantly reduced DMN toxicity in rats. No DMN demethylase activity was detected in rat lung microsomes under any of these experimental conditions. The results ruled out a direct action of MC or its metabolite(s) on hepatic DMN demethylase activity; they also suggested that in the liver, demethylation and subsequent nonenzymatic transformation to a potent alkylating agent (diazoalkane) is an obligatory step in the carcinogenic action of DMN, and possibly of other dialkylnitrosamines.

69-1424 AN ELECTRON MICROSCOPIC AND BIOCHEMICAL STUDY ON THE CHANGES OF ENDOPLASMIC RETICULUM IN RAT LIVER INDUCED BY 3'-METHYL-4-DIMETHYL-AMINOAZOBENZENE AND PHENOBARBITAL. (Jap.) Konno, Y. (Sapporo Med. Coll., Japan). Sapporo Igaku Zasshi (Sapporo Med. J.) 33(3): 145-162, 1968.

The liver cells of Wistar rats fed 3'-methyl-4-dimethylaminoazobenzene (MDAB; 0.06%) showed a marked increase in the smooth endoplasmic reticulum (SER), which was of a fine, vesicular and tubular structure, closely packed in the cytoplasm. The SER in liver cells of phenobarbital (P)-treated rats showed a fine, branched tubular pattern, with a higher density than the SER seen after MDAB treatment. The rough endoplasmic reticulum (RER) was markedly affected by MDAB feeding, with a semicircular pattern, fragmentation and detachment of ribosomes. Treatment with P caused similar but less marked changes. Liver cells from fasted rats showed a slight increase in RER profiles in the glycogen-containing areas, but no morphological changes in the RER. Activities of drug-metabolizing enzymes were increased after treatment with P, but not after MDAB admin.

69-1425 THE HISTOLOGICAL AND AUTORADIOGRAPHICAL STUDIES OF MOUSE LIVER DURING THE COURSE OF CARCINOGENESIS BY DIMETHYLNITROSAMINE. (E.) Takayama, S. (Cancer Inst., Tokyo). Z. Krebsforsch. 71(3):246-254, 1968.

In male ICR mice fed diets containing 50 ppm of dimethylnitrosamine for 1 day-35 wk., a definite correlation was noted between the proliferation of sinusoidal endothelial cells and the autoradiographic localization of ^{3}H-thymidine in the liver, suggesting that malignant hemangioendothelial sarcomas of the liver (observed in mice sacrificed after 35 wk.), induced by this carcinogen, may develop from proliferation of the sinusoidal endothelial cells.

69-1426 COMPARATIVE STUDIES ON THE NODULAR HYPERPLASIA IN RAT LIVER INDUCED BY DL-ETHIONINE, 3'-METHYL-4-DIMETHYLAMINOAZOBENZENE AND 2-ACETYLAMINOFLUORENE. (Jap.) Konishi, Y.

(Nara Med. U., Japan). Nara Igaku Zasshi (J. Nara Med. Assn.) 19(3):345-363, 1968.

Livers of rats fed diets containing DL-ethionine, 3'-methyl-4-dimethylaminoazobenzene (MDAB) or 2-acetylaminofluorene showed the same 2-stage histological response (oval cell proliferation, followed by nodular hyperplasia). Ultrastructural characteristics of nodular hyperplasia (involving chiefly the nucleolus and smooth endoplasmic reticulum) were similar in the nodular hyperplastic lesions induced by these 3 carcinogens. DNA turnover was more rapid in the areas of nodular hyperplasia than in normal liver tissue or hepatoma (especially in MDAB-induced nodular hyperplasia), sugggesting that nodular hyperplasia may play an important role in experimental liver carcinogenesis.

69-1427 EFFECT OF DIFFERENCE OF PROTEINS (CASEIN, GLUTEN, ZEIN) AND SUPPLEMENT OF AMINO ACIDS (LYSINE, TRYPTOPHAN) ON HEPATIC INJURIES INDUCED BY p-DIMETHYLAMINOAZOBENZENE. (E.) Ishiwata, Y. (Osaka U. Med. Sch., Japan). Med. J. Osaka U. 18(4):347-360, 1968.

Hepatocarcinogenesis by 4-dimethylaminoazobenzene (DAB; 0.05% in diet for 4 wk., then 0.06% for 20 wk.; in another experiment, 0.06% for 30 wk.) was studied in male Sprague-Dawley rats of 3 age groups (65-75 g, 180-210 g and 200-230 g). Throughout the experiment the rats were fed synthetic diets containing 18% casein (providing sufficient quantities of essential amino acids for the growth of young rats), 18% gluten (lysine-deficient) or 18% zein (lysine- and tryptophan-deficient). In rats fed these diets without amino acid supplements, the liver tumor incidences (av. values for the 2 courses of DAB) after 36 wk. were 15%, 19% and 23%, resp. Addition of L-lysine (1.0%) to the gluten or zein diets, or addition of L-lysine (1.0%) + tryptophan (0.2%) to the zein diet, significantly increased the tumor incidence (av. 59%, 54% and 58%, resp.), but addition of tryptophan alone to the zein diet did not significantly increase the tumor incidence (av. 30%). All young rats fed DAB-free synthetic diets of these compositions showed insufficient body wt. gains. The incidence of liver cysts, cholangiofibrosis and nodular hyperplasia varied according to the type of dietary protein (the incidence of fibrosis and cirrhosis was about the same with each diet), and was not significantly affected by amino acid supplementation.

69-1428 ENHANCEMENT OF N-NITROSODIETHYLAMINE HEPATOCARCINOGENESIS BY L-TRYPTOPHAN IN RATS. (E.) Kawachi, T. (Nat. Cancer Ctr. Res. Inst., Tokyo), Y. Hirata and T. Sugimura. Gann 59(6):523-525, 1968.

No tumors developed in 18 male Wistar rats treated for 140 days with L-tryptophan (T; 1% in diet). In rats treated for 140 days with diethylnitrosamine (DEN; N-nitrosodiethylamine; 20 mg/liter in drinking water), the incidence of liver tumors after 192 days was 17% (4/23 rats; 3 hepatocellular carcinomas, 1 hemangioma). Addition of T to DEN (same regimens) increased the liver tumor incidence to 62% (13/21 rats; 2 hemangiomas, 10 hepatocellular carcinomas, 1 mixed hepatocellular carcinoma and hemangioma). No tumors were seen in any other organs.

69-1429 ALTERATION OF THE MICROSOMAL HEMOPROTEIN BY 3-METHYLCHOLANTHRENE: EFFECTS OF ETHIONINE AND ACTINOMYCIN D. (E.) Alvares, A. P. (Burroughs Wellcome & Co., Tuckahoe, N. Y.), G. Schilling, W. Levin and R. Kuntzman. J. Pharmacol. Exp. Ther. 163(2): 417-424, 1968.

The hepatic microsomal hemoprotein from untreated or phenobarbital-treated rats showed an ethyl isocyanide difference spectrum with 2 major peaks (at 455 and 430 mμ) and a carbon monoxide difference spectrum with 1 major peak (at 450 mμ) After 3 days of treatment with 3-methylcholanthrene (MC; 20 mg/kg/day i.p.), the major peaks of the ethyl isocyanide difference spectrum were 453 and 430 mμ, and the major peak of the carbon monoxide difference spectrum was seen at 448 mμ. The differences in the carbon monoxide difference spectra of control and MC-treated preparations disappeared after solubilization of the microsomal hemoproteins by snake venom. MC also caused a 6-fold increase in 3,4-benzpyrene hydroxylation by liver homogenates. Since these responses to MC were all blocked by pretreatment with protein synthesis inhibitors (actinomycin D or DL-ethionine; the effects of ethionine, in turn, were blocked by DL-methionine), it is suggested that MC causes the synthesis of a spectrally different hemoprotein in rat liver microsomes.

69-1430 ENZYME-CATALYSED REACTIONS OF POLYCYCLIC HYDROCARBONS WITH DEOXYRIBONUCLEIC ACID AND PROTEIN IN VITRO. (E.) Grover, P. L. (Roy. Cancer Hosp., London) and P. Sims. Biochem. J. 110(1):159-160, 1968.

When ^{3}H-labeled polycyclic hydrocarbons were incubated with purified DNA or protein in the presence of rat liver microsomes, all compounds reacted with both protein and DNA but only in the presence of cofactors (nicotinamide adenine dinucleotide phosphate, glucose-6-phosphate and glucose-6-phosphate dehydrogenase). The reactions of these compounds with protein were of about the same extent, but the reactions with DNA varied widely (3,4-benzpyrene, 3-methylcholanthrene, benz(a) anthracene, 7,12-dimethylbenzanthracene, dibenz(a,c)anthracene, dibenz(a,h)anthracene, pyrene and phenanthrene, in decreasing order of reactivity). The reactions presumably inolved the formation of metabolic intermediates roduced by the microsomal system.

9-1431 THE EFFECT OF N'-NITRO-N-NITROSO-N-METHYLGUANIDINE ON THE LIVER AFTER DMINISTRATION TO THE RAT. (E.) Craddock, . M. (Med. Res. Coun. Lab., Carshalton, England). xperientia 24(11):1148-1149, 1968.

ntragastric instillation of nitrosoguanidine 20 mg in aqueous soln.; 1 dose, or 2-4 doses ver 1-6 hr.) to female rats (Porton derived) nduced massive biliary cystadenomas in 6/6, hich were detected at death or sacrifice approx. yr. later. The hepatic parenchymal cells howed considerable variation in nuclear size many nuclei were hyperchromatic and enlarged), imilar to that observed after admin. of hepatic arcinogens. All animals also showed squamous ell carcinomas of the stomach, 1/6 had a ibrosarcoma of the leg with metastases to the ung and 1 had an adenocarcinoma in the porta epatis (derived from pancreatic duct or bile uct).

9-1432 REVERSIBILITY OF EXPERIMENTALLY INDUCED EPITHELIAL CHANGES IN THE URINE CERVIX. (E.) Majima, T. (Osaka U. Sch. ed., Japan). J. Jap. Obstet. Gynec. Soc. [Eng.] 5(3):143-158, 1968.

The epithelial changes induced in the uterine cervix of adult ICR mice by 3-methylcholanthrene-impregnated strings were similar to changes seen in man, and were graded into nonatypical hyperplasia, atypical hyperplasia (Types I, II and III) and invasive carcinoma. Incidence rates of epithelial changes and ^{3}H-thymidine labeling indices showed Type III changes for columnar epithelium, which was considered irreversible and probably a precursor of invasive carcinoma. Type I changes occurred in squamous epithelium, and were divided into 2 subclasses according to basal cell activity; squamous Type Ib and higher grade changes were considered irreversible and probably progressed to invasive carcinoma. An additional type of carcinogenic process in squamous epithelium was indicated, in which the epithelium was not necessarily completely replaced by atypia. It is concluded that both the columnar and squamous epithelial changes induced in the mouse cervix are similar to those seen in man, the Type III mouse changes corresponding to human cervical carcinoma *in situ*, which suggests that human carcinoma *in situ* may also be irreversible.

69-1433 INFLUENCE OF THE UTERUS ON THE DEVELOPMENT OF EXPERIMENTAL OVARIAN TUMORS. (Ger.) Gitsch, E. (U. Women's Clin., Vienna) and J. H. Holzner. Arch. Gynaek. 206(3):348-368, 1968.

During various stages of the estrus cycle, mature female albino (Sprague-Dawley) rats underwent 1 of 3 different surgical procedures: oophorectomy with intrasplenic implantation of ovarian and uterine tissue (Group A), intrasplenic ovarian grafting alone (Group B), or intrasplenic ovarian grafting followed by total hysterectomy (Group C). The incidence of ovarian tumors in the splenic implants (1 yr. later) was significantly higher in Group C (15/27 evaluated animals) than in Groups A or B (3/22 and 8/25, resp.), suggesting that the presence of the uterus inhibited the development of these ovarian tumors. The ovarian tumor frequency was significantly higher in rats undergoing these procedures during proestrus (16 tumors in 28 rats) than in animals operated on during estrus or diestrus (5/24 and 5/22, resp.). No correlation between tumor histology and the phase of the estrus cycle was noted, but the number of luteomas and mixed tumors was higher in Group C than in Group A.

69-1434 TUMORIGENESIS IN THE ANDROGEN-STERILE RAT: RECIPROCAL INCIDENCE OF CARCINOGEN INDUCED-MAMMARY GLAND AND OVARIAN TUMORS. (E.) Stern, E. (U. California, Los Angeles), M. R. Mickey and L. Osvaldo. Rass. Neurol. Veg. 21(1-2):99-117, 1967.

Female Sprague-Dawley rats, neonatally sterilized by testosterone propionate (TP), received 7,12-dimethylbenzanthracene (DMBA; 20 mg p.o.) at age 50 days; the incidence of mammary and ovarian (granulosa cell) tumors and ovarian cysts was studied at age 150 days. Only the DMBA-treated rats developed mammary or ovarian tumors; 6/26 controls admin. TP + the DMBA vehicle (sesame oil) developed ovarian cysts. The mammary tumor incidence was higher with DMBA alone than with DMBA + TP (21/25 and 11/23, resp.); the ovarian tumor incidence was significantly higher with DMBA + TP than with DMBA alone (5/23 and 2/25, resp.; 4/5 and 2/2, resp., also showed ovarian cysts). Mammary and ovarian tumors were never seen in the same animal. A significant correlation was seen between the immediate response to DMBA in androgen-sterilized rats (interruption of persistent estrus) and subsequent tumor development. It is suggested that mammary carcinogenesis in androgen-sterilized rats may be inhibited by the ovarian androgen produced by the abundant interstitial tissue.

69-1435 BIOASSAYS WITH INBRED MICE: THEIR RELEVANCE FOR THE RANDOM-BRED ANIMAL. (E.) Poel, W. E. (U. Pittsburgh, Pa.). Progr. Exp. Tumor Res. 11:444-460, 1969.

Parallel studies with virgin female C3H and C3HeB mice showed progesterone as a potent co-carcinogen for viral or chemical mammary carcinogenesis, but without carcinogenic activity by itself. Parallel studies with virgin female C3H and C57 Leaden mice suggested that 2 synthetic contraceptives (estrogen + progesterone derivative combinations) were cocarcinogenic for the induction of pituitary tumors only in mice prone to such "spontaneous" tumors. Both experiments indicated the inadequacy of a bioassay of only 1 inbred strain of mice. Random-bred hybrids (from 4-way crossed offspring of C57 Leaden, C3HeB SWR, and 129Rr/J inbred mice) revealed a wider range of reactions to hormonal contraceptives than reported for their inbred progenitors, with a diminished incidence or an absence of malignant or non-malignant lesions that characterized the inbred parent strains. It is concluded that the preferred biological tool for long-term bioassays may be the random-bred hybrid.

69-1436 PROLACTIN AND GROWTH HORMONE LEVELS IN THE ANTERIOR PITUITARY OF RATS BEARING MAMMARY TUMOR INDUCED BY 7,12-DIMETHYLBENZ(a)ANTHRACENE. (E.) Yanai, R. (Nat. Cancer Ctr. Res. Inst., Tokyo) and H. Nagasawa. Gann 59(6):543-546, 1968.

Intragastric instillation of 7,12-dimethylbenzanthracene (20 mg in sesame oil) into female Sprague-Dawley rats (50-55 days old) induced mammary tumors in 26/27 (96%) animals 150 days later (av. 2.3 tumors/rat), with a mean latent period of 75 days. The ovarian wt. was increased and adrenal wt. decreased (compared to untreated controls). Pituitary prolactin and growth hormone contents were significantly lower in treated rats than in controls, despite an increased av. pituitary wt.

69-1437 CANCER OF THE BREAST IN AN ADOLESCENT GIRL. (Heb.) Izsak, F. Ch. (Jaffa Gov. Hosp., Israel) and M. Krispin. Harefuah 75(11):464-466, 501, 1968.

A 12-yr.-old girl with menometrorrhagia of unknown cause was successfully treated with diethylstilbestrol (10 mg/day for about 1 wk.). Vaginal bleeding recurred 2 yr. later and was controlled by a 4-day course of ethynylestradiol. The pt. was discharged with instructions to continue the same treatment, but misunderstood the directions and instead took 20 tablets/mo. of Enovid (mestranol + norethynodrel) for 2.5 yr., with only 1 interruption (lasting 2 mo.). At age 16 yr., the pt. was admitted with an undifferentiated carcinoma of the breast, which progressed rapidly (the pt. died 8 mo. after onset). Examination of the Israeli records for 1960-1964 showed a low incidence of breast cancer in pts. under 20 (4/2707 cases); the breast cancer mortality in adolescence was 1/million, compared to 246/million at all ages. The possible roles of estrogens and progesterone (and of contraceptives containing these hormones) in the etiology of breast cancer are discussed.

69-1438 INDUCTION OF LEUKEMIA AND AMYLOIDOSIS IN SENILE C57BL MICE BY ORAL FEEDING OF 3-METHYLCHOLANTHRENE IN OLIVE OIL SOLUTION. (E.) Akamatsu, Y. (Osaka U. Sch. Med., Japan), R. Ikegami, K. Watanabe and M. Kikui. Gann 59(6):489-496, 1968.

In C57BL mice, single intragastric doses of 0.25 mg of 3-methylcholanthrene (MC; in olive oil soln.) at age 53-68 wk. induced leukemia in 8/57 (14%) males and 9/39 (23%) females at age 62-73 wk. At 0.50 mg, MC induced leukemia in 25/40 females (60%), indicating that female mice were more susceptible to MC leukemogenesis than males. Myeloid leukemia was seen in 25 animals, lymphatic leukemia in 14 and reticulum cell sarcoma in 3. The incidence of lymphatic leukemia increased from 2/39 at the smaller dose to 11/40 at 0.50 mg. Only 1/139 male and 6/172 female untreated controls developed leukemia (myeloid) in old age (age 51-95 wk.). Systemic amyloidosis involving the spleen, liver and kidney was observed in 5/57 males and 6/39 females treated with 0.25 mg of MC, and 6/40 females treated with 0.50 mg of MC. The amyloid exhibited autofluorescence similar to that of MC; and it is postulated that the formation of amyloid is an attempt by the body to detoxify the carcinogen. The relationship of physiological hematology and senility in this low-leukemia strain of mice to their susceptibility to chemical carcinogens and leukemogenesis is discussed.

69-1439 INDUCTION OF LEUKEMIA IN HAMSTERS BY 9,10-DIMETHYL-1,2-BENZANTHRACENE. (Rus.) Zil'fian, V. N. (Armenian Inst. Roent. Oncol., Erevan, USSR), B. S. Fichidzhian and V. A. Kumkumadzhian. Zh. Esp. Klin. Med. 8(1):11-15, 1968.

The leukemogenic effects of p.o. admin. 1:2,5:6-dibenzanthracene (DBA) and 7,12-dimethylbenzanthracene (DMBA) were compared in 2 groups of Armenian gray hamsters. During the 1-yr. observation period, none of the untreated controls developed leukemia. DBA (total dose, 127 mg over 5 mo.) did not induce leukemia, but 2/8 animals that died during the observation period showed tumors of the cervical region. DMBA (total dose, 25 mg over 3 mo.) induced leukemia in 9/35 animals during the observation period (6/9 developed leukemia after 6-8 mo. of observation) and 6 other animals developed lymphatic tumors.

69-1440 MECHANISM OF THE LEUKEMOGENIC ACTION OF SEX HORMONES. (Rus.) Grigorovich, N. A. (Inst. Exp. Path. Ther., Sukhumi, USSR). Biull. Eksp. Biol. Med. 66(10):71-74, 1968.

Leukemogenic doses of estradiol monobenzoate (250 μg/wk. s.c.; total 250-2200 μg) were admin. to 250 inbred white mice (both sexes); after 1-60 days of treatment the mice were sacrificed, and the elastic properties and orientation of the molecules of splenic deoxyribonucleoprotein (DNP) were studied. The results obtained were variable up to day 30, but the later results were reproducible. The elastic deformation of the oriented DNP molecules from the spleens of treated mice (males or females) was less than the deformation seen in spleens of untreated controls after 30 days of treatment; after 60 days, this elastic deformation of DNP molecules was greater in the spleens from treated animals than in control tissue. The results were interpreted as indicating disruption of the bonds between the DNA and protein components of DNP.

69-1441 NEOPLASMS AND PARAPROTEINS FROM MINERAL OIL IN BALB/c MICE. (It.) Invernizzi, F. (U. Milan, Italy), A. Cantaboni, F. Fantini and R. Cattaneo. Morgagni (Milan) 1(1):37-52, 1968.

Two groups of inbred BALB/c mice were treated with mineral oil (Esso "Bayol F;" 0.5 ml/inj. i.p.); 30/42 received 5 inj. (4 at intervals of about 2 mo., the last after a 6-8-mo. interval) and 12/42 received 4 inj. (3 at intervals of 6-8 mo., the last after a 5-mo. interval). At 20 mo. after the beginning of treatment, 6/42 were alive and the others had died (or had been sacrificed). Detailed pathological examinations were performed in 23 mice, showing granulation tissue in 3/23, granulation tissue with marked plasma cell infiltration in 13/23, plasmacytomas in 5/23 and sarcomas in 2/23. Hemorrhagic ascites and/or large tumors (over 5 mm in diameter) were found in 12/23. Examination of the serum proteins of 14/23 showed increased immunoglobulins (sometimes of the IgM or cryoglobulin type) in 6/14, borderline paraproteinemia in 3/14 and true paraproteinemia in 5/14. The tumors were interpreted as neoplastic transformation reactions to a persistent stimulus in a genetically predisposed strain.

69-1442 URETHANE AS A COMPLETE CARCINOGEN FOR THE SKIN OF NZO/Bl MICE. (E.) Bielschowsky, F., M. Bielschowsky and E. F. D'Ath. Proc. Univ. Otago Med. Sch. 46(2):31-32, 1968.

During a study of the effects of 3 wk. of treatment with urethan alone (1 inj./wk. of 1 mg/g i.p.) on the lymphatic system of 5-7-wk.-old mice, a high incidence of skin papillomas was noted in strain NZO/Bl mice. A strong sex difference was noted in the incidence of papillomas (32/36 or 83% in males, 24/36 or 67% in females), the av. number of tumors/animal (26.0 and 14.2, resp.) and the latency of the first tumors (6 and 14 wk., resp.); 5 invasive carcinomas later developed in males, and 4 in females (1/4 with lymph node metastases), showing that urethan is a complete carcinogen for the skin in mice of this strain. No skin tumors developed in 71 mice of strain NZB/Bl, and only 8 papillomas in 75 mice of strain NZC/Bl, after the same treatment.

69-1443 COMPARATIVE STUDIES OF THE VITAL STAINING OF NORMAL AND TUMOR CELLS. (Ger.) Wittekind, D. (F. Hoffman-La Roche & Co., Basel, Switzerland), J. Staubesand and G. Rentsch. Blut 18(1):22-32, 1968.

Papillomas and carcinomas induced by application of 3,4-benzpyrene to the skin of mice showed granular deposits of dye after vital staining with acridine orange, but the normal squamous epithelial cells did not. Other dyes used to identify these tumor cells included fluorochrome (with acridine orange), neutral red and the May-Grünwald-Giemsa stain.

69-1444 LOCALIZATION OF ADENOSINE TRIPHOSPHATASE ACTIVITY IN PRENEOPLASTIC AND CANCEROUS CELLS OF THE MOUSE SKIN INDUCED BY METHYLCHOLANTHRENE. (E.) Sugár, J. (Res. Inst. Oncopath., Budapest), O. Csuka and J. Tóth. J. Histochem. Cytochem. 16(11):678-687, 1968.

In male Swiss mice painted with 3-methylcholanthrene (2 applications/wk. of 0.5% soln. in acetone), hyperplasia usually appeared after 1 or 2 wk., papillomas after 5-8 wk., and carcinomas after 3-4 mo. of treatment. In normal epidermis, adenosine triphosphatase (ATPase) activity was seen in contact with all of the cell membranes facing the intercellular spaces. In preneoplastic lesions, ATPase was seen along the cell membranes of the basal and suprabasal cells of the epithelial pegs; many deposits of lead PO_4 were noted in the enlarged intercellular spaces and on the surfaces of the cytoplasmic processes. Membrane-bound ATPase activity was more intense in the premalignant cells than in the normal cells, but the premalignant cells showed no ATPase in the cell membranes facing the basement membranes, or in the desmosomes. The ATPase reaction was less intense in the carcinoma cells; only a few cells showed ATPase activity on the surface.

69-1445 A STUDY ON TRANSPLANTATION IMMUNITY OF EHRLICH ASCITES TUMOR AND METHYLCHOLANTHRENE-INDUCED TUMOR IN MICE WITH SPECIAL REFERENCE TO LOCAL IMMUNITY OF LYMPH NODES DRAINING THE SITE OF SENSITIZATION. (E.) Kitano, M. (Kyoto U., Japan) and Y. Okada. Bull. Chest Dis. Res. Inst. Kyoto U. 1(1-2): 1-17, 1968.

Inbred DDD and C3H mice (2-3 mo. old), pretreated with irradiated (^{60}Co; 15,000 r) Ehrlich ascites carcinoma or 3-methylcholanthrene-induced fibrosarcoma cells showed a marked immune resistance to later s.c. transplantation of the same tumors, but this resistance was not elicited by inoc. of irradiated normal mouse tissue. A method for transplanting tumor cells into the inguinal lymph nodes (to study local immunity in the regional lymph nodes draining the tumor inoc. site) is described. Results of an experiment in immunized mice showed a stronger immune resistance to the tumors in these inguinal lymph nodes than in other tumor inoc. sites.

69-1446 ENHANCEMENT OF RESPONSES TO CHEMICAL CARCINOGENS BY NONONCOGENIC VIRUSES AND ANTIMETABOLITES. (E.) Southam, C. M. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.), S. Tanaka, T. Arata, D. Simkovic, M. Miura and S. F. Petropulos. Progr. Exp. Tumor Res. 11:194-212, 1969.

In Swiss mice admin. 5 or 10 topical doses of 3-methylcholanthrene (MC; 1% soln. in benzene), the incidence of papillomas was consistently increased by infection with herpes simplex, West Nile or Bunyamwera viruses, or treatment with chloramphenicol or a variety of antitumor agents (actinomycin D, mitomycin C, chloroquine and several halogenated pyrimidines). Sarcomas induced by i.m. inj. of MC were also accelerated by concurrent inoc. of Bunyamwera virus or mitomycin C. Possible mechanisms for this joint tumor-inducing effect (immunosuppression, changes in intracellular metabolism increasing the frequency of malignant transformation, or systemic effects delaying MC elimination) are discussed.

69-1447 INFLUENCE OF VITAMIN E AND PROPYL GALLATE ON BENZPYRENE CARCINOGENESIS IN MICE. (It.) Bonmassar, E. (U. Milan, Italy), R. Dallavalle and G. Giuliani. Arch. Ital. Pat. Clin. Tumori 11(1-2):245-250, 1968.

In female Swiss albino mice, treated s.c. for 20 days with 3,4-benzpyrene (BP; 0.1 ml of 1 mg/ml soln.) in pure ethyl oleate or in ethyl oleate containing 0.05% propyl gallate, s.c.) sarcomas appeared within 9-10 wk. in both groups; 28 wk. after the beginning of treatment, mortality rates were 100% and 70%, resp., treated with benzpyrene + ethyl oleate + propyl gallate. In another group of mice treated with BP (same dose as above) in ethyl oleate containing 0.03% α-tocopherol, hard infiltrating masses appeared within 5-6 wk.; after 28 wk., almost all animals showed gradual tumor regression and a mortality rate of only 30%. It is concluded that the inhibitory effect of vitamin E on BP-induced tumors may result from a high antigenicity of rapidly induced tumors.

69-1448 ACCELERATED CARCINOGEN TESTING. (E.) Homburger, F. (Bio-Res. Inst., Cambridge, Mass.) and J. R. Baker. Progr. Exp. Tumor Res. 11:384-394, 1969.

Male C57BL/6J mice and male Syrian hamsters (BIO line) were inj. s.c. with 3,4,9,10-dibenzpyrene (DBP; 25 or 500 μg, resp., in tricaprylin). When pooled DBP inj. sites were inoc. into untreated recipients (each animal received 4 such transplants), the development of fibrosarcomas was accelerated. This acceleration was particularly marked in hamsters; when inj. sites (obtained 2 days after DBP inoc.) were transplanted into the recipient hamsters, histologically malignant fibrosarcomas developed within 4 wk. The appearance of atypical RNA-loaded fibroblasts (apparently representing a premalignant cell form) around the inj. site, was more rapid in hamsters than in mice. A system using inbred hamster strains, selected for the susceptibility of their s.c. fibroblasts to carcinogens, is recommended for the development of a rapid tumor induction test.

69-1449 CARCINOGENIC CYCLOPENTA(a)PHENANTHRENES. (E.) Coombs, M. M. (Imperial Cancer Res. Fund, London) and C. J. Croft. Progr. Exp. Tumor Res. 11:69-85, 1969.

The carcinogenic effects of 29 cyclopenta(a)phenanthrenes were studied in T.O. random-bred mice (the compounds were admin. s.c. or by skin painting). The compounds tested belonged to 3 series: 17-methylated compounds with unsaturated D rings (all of which showed some activity), 17-methylated compounds with saturated D rings (2/6 were active, the 11-methyl- and 11,12-dimethyl compounds), and 17-ketones (only the ketones with 11-methyl- groups were active). Addition of an 11-methyl- group promoted carcinogenicity in all 3 series. None of the active compounds was as potent as 3-methylcholanthrene or 7,12-dimethylbenzanthracene. None of the cyclopenta(a)phenanthrenes tested has been isolated from natural sources, but the structural similarity of these compounds to naturally occurring steroids is pointed out.

69-1450 EPITHELIAL ATYPIA IN THE HAMSTER CHEEK POUCH, INDUCED BY TOPICAL APPLICATION OF VITAMIN A. (E.) Polliack, A. (Hebrew U.-Hadassah Med. Sch., Jerusalem) and I. S. Levij. Oncology (Basel) 22(2-3):129-136, 1968.

The progression of epithelial atypia was studied in cheek pouches of male Syrian golden hamsters after 2-12 wk. of cheek pouch painting with vitamin A palmitate (VAP; 10% or 20% in liquid paraffin; 3 paintings/wk.). Mucoid metaplasia was seen only at the higher VAP conc. Focal epithelial hyperplasia progressed with the duration of the experiment; it was more marked at the higher VAP conc., and eventually progressed to foci of marked epithelial atypia. Mononuclear infiltrates were seen in the lamina propria in the later stages of treatment, especially at the higher VAP conc. No pathological changes were seen in controls painted only with liquid paraffin. It is suggested that these epithelial changes may result from gradual liberation of lysosomal enzymes over a long period, leading to structural alterations in nuclear material and decreased inhibition of mitotic activity.

69-1451 MODIFIERS OF CARCINOGENESIS. (E.) Homburger, F. (Bio-Res. Inst., Cambridge, Mass.) and A. Tregier. Progr. Exp. Tumor Res. 11:86-99, 1969.

The effects of the vehicle on the induction of s.c. fibrosarcomas by 3,4,9,10-dibenzpyrene (DBP; benzo(rst)pentaphene; 500 μg in 0.1 ml vehicle) were studied in C57BL/6J mice. The latent induction time was 14.0-14.5 wk. for DBP in tricaprylin and peanut oil, 16.5-18.0 wk. for DBP in mineral oil and Ringer's soln. containing 25% acetone and 2% Tween 20; with DBP in human β-lipoprotein or in Ringer's soln. without additives, tumor induction times were 37.0 and 60.0 wk., resp. Solubility of DBP in these vehicles was inversely proportional to the latent tumor induction time. When derivatives of DBP (benzo(rst)pentaphene-5,8-diol diacetate, benzo(rst)pentaphene-5,8-diol dibenzoate, or benzo(rst)pentaphene-5,8-dione) were admin. prior to or simultaneously with DBP inj., the oxidative derivatives reduced the rate of tumor induction by DBP. In female mice of several strains treated i.v. with DBP (500 μg) in Ringer's soln. + Tween 20, studies of the lung tumor incidence after 3.5 and 7 mo. showed high DBP susceptibility in strains A/J, DBA/2J, and SJL/J, and moderate susceptibility in strains RF/J and C57BL/6J; susceptibility was close to untreated control values in strains CBA/J, C57BR/cdJ, C57L/J, C3H/J, and DBA/1J.

69-1452 VIRUS PARTICLES INDUCED WITH CARCINOGENIC HYDROCARBONS. (E.) Ikuta, F. (Niigata U. Sch. Med., Japan) and H. M. Zimmerman. Proc. Virchow Med. Soc. N. Y. 26:394-415, 1968.

C3H mice were implanted intracerebrally or i.m. with 3-methylcholanthrene, 3,4-benzpyrene and 1:2,5:6-dibenzanthracene; virus particles were investigated by electron microscopic examination of the lesions (132 brain and 10 muscle lesions) after up to 2 yr. and 4 mo., resp. Most lesions in the precancerous stages showed cylindrical or filamentous particles, with many morphological similarities to known viruses, in the reactive cells. These intracytoplasmic particles disappeared with the development of tumors; they were seen only in lesions induced by the carcinogens, and were morphologically identical regardless of the inducing carcinogen or the tissue involved. Further studies led to the conclusion that the particles originated from the endoplasmic reticulum and the ribosomes of the reactive cells stimulated by the carcinogens.

69-1453 INHIBITION OF THE CARCINOGENIC ACTION OF 7,12-DIMETHYLBENZ(a)ANTHRACENE BY BETA-NAPHTHOFLAVONE. (E.) Wattenberg, L. W. (U. Minnesota Med. Sch., Minneapolis) and J. L. Leong. Proc. Soc. Exp. Biol. Med. 128(4):940-943, 1968.

In female A/HeJ mice fed diets containing β-naphthoflavone (NF; 2 mg/g diet) for 2 wk. before the admin. of 7,12-dimethylbenzanthracene (DMBA; 1.50 mg in 2 p.o. doses, each of 0.2 ml of emulsion), the lung adenoma count in 16 animals at risk, 14 wk. after DMBA admin., was 5 ± 3; in 14 DMBA-treated controls, the lung tumor count was 16 ± 4. In female Sprague-Dawley rats admin. 1 p.o. dose of NF (0.1 mmole) prior to DMBA admin. (3 doses of 1 ml of emulsion, p.o.), the mammary tumor incidence 52 wk. later was 47%, compared to 100% in DMBA-treated controls. NF caused a significant increase in 3,4-benzpyrene hydroxylase activity in mouse small intestine and lung (but not in the liver) and in rat liver and small intestine.

69-1454 EXPERIMENTAL LUNG CANCER IN RABBITS INDUCED BY CHEMICAL CARCINOGENS. (E.) Hirao, F. (Osaka U. Sch. Med., Japan), T. Fujisawa, E. Tsubura, Y. Akamatsu and Y. Yamamura. Gann 59(6):497-505, 1968.

Rabbits were treated with 3-methylcholanthrene (MC; 20 mg), alone or in combination with 4-nitroquinoline 1-oxide (NQO; 0.2 mg) by intrabronchial infusion (4-41 doses at 1-wk. intervals over 31-397 days). In young rabbits (30-40 days old) admin. NQO + MC (in rabbit serum) by intrabronchial infusion, combined with s.c. inj. of NQO (0.1 mg/wk.). the lung tumor incidence was 15/25 (11 adenocarcinomas and 1 case each of undifferentiated or squamous cell carcinoma, mesothelial tumor, and mixed squamous cell and adenocarcinoma); the 10/25 developing no lung tumors included 2/9 animals admin. 17 doses or more of the carcinogens. In adult rabbits admin. intrabronchial infusions of MC alone (aqueous soln.), the lung tumor incidence was 3/7 (2 adenocarcinomas, 1 squamous cell carcinoma); 1 animal developed systemic amyloidosis without lung cancer after 322 days of treatment (34 doses of MC). The 5 rabbits developing typical lung carcinomas (with local metastases and/or invasion of the adjacent tissues) had been treated for 127-397 days (16-41 doses). In a 15-day study of 5 rabbits admin. MC by intrabronchial infusion, autofluorescent examination of the lungs showed rapid disappearance of MC admin. in Tween 60 vehicle, but MC in aqueous soln. was retained by the lungs.

69-1455 PROBLEMS OF OCCUPATIONALLY RELATED LUNG CANCER. LONG-TERM OBSERVATIONS IN THE BASF (Badische Aniline and Soda Manufacturing Company). I. (Ger.) Oettel, H.

(Badischen Anilin & Soda-Fabrik AG, Ludwigshafen-/Rhine, Germany), A. M. Thiess and C. Uhl. Zbl. Arbeitsmed. 18(10):291-303, 1968.

From 1912-1967 (inclusive), lung cancer was found in 373 male employees (and 1 female employee) of this chemical factory. The incidence remained fairly stable until 1950, then rose sharply; 260/373 cases were seen in 1957-1967 (inclusive). The lung cancer incidence/av. number of male employees at any given time was 5/24,400 in 1936-1940, 134/40,370 in 1961-1965, 21/41,220 in 1966 and 21/40,700 in 1967. The absolute number of cases fell somewhat in 1966 and 1967, but 150 cases are expected for the next 5-yr. period. The marked increase in lung cancer after 1950 coincided with an increase in the reported incidence of smoking (no other details). Peak ages in the lung cancer pt. group were 55-65 yr.; the only pt. under 41 was a moderate smoker, employed for about 1 yr. and exposed to highly toxic borane compounds. The lung cancer incidence, tabulated according to occupation in the 259 pts. seen from 1957-1967 (inclusive), was 138-158/10,000 similarly employed persons in 2 groups (mechanics and transportation workers) and 31.8-56.5 in 3 other groups; the only significantly increased incidence was seen in insulation workers (7/171 insulation workers = 410/10,000). These 7 men were smokers; only 1/7 showed asbestosis, and none of the tumors was identified as a mesothelioma. Occupational risks of bladder cancer are also briefly discussed: of the 102 cases seen in Ludwigshafen in 1895-1958, 74 were traceable to known bladder carcinogens (β-naphthylamine in 71/74, diaminodiphenyl in 3/74), and at least 25 others to suspected bladder carcinogens (including anilines). A connection between bladder cancer and smoking was suspected.

69-1456 α-NAPHTHYLAMINE AND β-NAPHTHYLAMINE IN CIGARETTE SMOKE. (E.) Hoffmann, D. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.), Y. Masuda and E. L. Wynder. Nature (London) 221(5177):254-256, 1969.

Methods for the identification, isolation and quantitative determination of these compounds from the mainstream of cigarette smoke are described. The av. levels of α- and β-naphthylamine were only 2.7×10^{-8} and 2.2×10^{-8} g/cigarette, resp. It is suggested that because of its very low conc., the β-naphthylamine in cigarette smoke is of doubtful biological significance as a bladder carcinogen.

69-1457 STUDIES ON LYSOSOMES--X. EFFECTS OF TUMOR-PROMOTING AGENTS UPON BIOLOGICAL AND ARTIFICIAL MEMBRANE SYSTEMS. (E.) Weissmann, G. (New York, U. Sch. Med., N. Y.), W. Troll, B. L. Van Duuren and G. Sessa. Biochem. Pharmacol. 17(12):2421-2434, 1968.

The effects of several complete carcinogens and tumor-promoting agents (cocarcinogens) on artificial and natural biological membranes were studied. The extent of release of lysosomal enzymes (β-glucuronidase and aryl sulfatase) from large-granule fractions of rabbit liver, by compounds with tumor-promoting activity, was in the same order as the cocarcinogenic effects of these compounds (phorbol ester fraction A, croton oil resin, crude croton oil, Tween 80, Tween 60, and a tobacco leaf extract, in decreasing order of *in vitro* activity). The effects of these agents on mitochondria (release of malate dehydrogenase), rabbit RBC and artificial membranes (release of marker anions from artificial lipid spherules) were not proportional to their cocarcinogenic activities. Liver lysosomes were not disrupted by tumor-initiating agents (7,12-dimethylbenzanthracene, 3-methylcholanthrene, β-propiolactone) or a complete, systemic carcinogen (2-acetylaminofluorene); the effect of 1 proximate carcinogen (N-hydroxy-2-acetylaminofluorene) was less than the effect of phorbol ester. It is concluded that tumor-promoting agents (as distinguished from complete or proximate carcinogens) disrupt biological membranes *in vitro*, their effects on lysosomal membranes being parallel to their biological activities *in vivo*.

69-1458 COMPLEXITY OF ENZYMATIC INHIBITION BY CIGARETTE SMOKE. (E.) Benedict, R. C. (U.S. Dept. Agri., Philadelphia, Pa.) and R. L. Stedman. Experientia 24(12):1205-1206, 1968.

The effects of filtered and unfiltered whole cigarette smoke (WS) and its separated phases, the vapor phase (VP) and particulate matter phase (PM) on yeast alcohol dehydrogenase were determined. Unfiltered WS caused strong inactivation, and PM contributed more to this inactivation than VP. Filtered (cellulose acetate-charcoal) WS was less inhibitory than unfiltered WS. Inactivation by PM was greater than by WS, indicating that VP and PM do not act additively. When VP and PM phases were mixed, this "reconstituted" smoke gave an inactivation curve similar to that of WS but less inhibitory than PM alone. The inactivation by both phases could be reversed by addition of cysteine after 75 min. Addition of cysteine concurrently with WS protected the enzyme and greatly reduced the rate of inactivation. A distinct increase in the initial inhibitory effect was obtained by removing the charcoal from the filter. It is concluded that VP inhibition is almost completely competitive, while PM and WS show a mixed inhibition. It is suggested that enzyme inhibition by WS depends on an interaction between inhibitors and antagonists.

69-1459 EFFECTS OF O_2 OR CO GAS EXPOSURE ON CARCINOGENESIS. (Jap.) Shintani, K. (Nagoya City U. Med. Sch., Japan). Nagoya Shiritsu Daigaku Igakkai Zasshi (J. Nagoya Univ. Med. Ass.) 19(2):485-524, 1968.

Mice of 2 age groups (5 or 9 wk. old at the beginning of treatment) were exposed for 20 min./day to oxygen (O_2; 70%) or carbon monoxide (CO; 0.1%) during feeding with 3'-methyl-4-dimethylaminoazobenzene (MDAB; 0.06% in diet). In the older mice exposed to O_2, CO or air (controls) during MDAB feeding, liver tumors developed in 69.2%, 38.5% and 46.2%, resp., after 14-20 wk. In the younger mice, the tumor incidences were 75%, 41.7% and 33.3%, resp. The CO-exposed mice (both age groups) lost body wt. during the first 2 wk., but gained wt. thereafter and eventually became the heaviest of the groups; the O_2-exposed mice began to lose wt. after 10-13 wk. The reduction in the RBC and increase in the WBC observed during treatment were greater in the O_2-exposed group than in the CO-exposed group. The higher tumor incidence in the younger animals was attributed to a longer course of MDAB admin. or possibly to the immaturity and instability of their hormonal functions. It is suggested that O_2 and CO affected both MDAB absorption and hormonal function.

69-1460 EFFECTS OF BRIGHTNESS OR DARKNESS ON CARCINOGENESIS. (Jap.) Sakakibara, T. (Nagoya City U. Med. Sch., Japan). Nagoya Shiritsu Daigaku Igakkai Zasshi (J. Nagoya Univ. Med. Ass.) 19(2):525-557, 1968.

Liver tumor induction by a 20-wk. course of 3'-methyl-4-dimethylaminoazobenzene feeding (0.06% in diet) was studied in 4 groups of 11-wk.-old mice. In mice exposed to flashing lights (1000 lux; switched on and off 30 times/minute for 8 hr./day), liver tumors developed in 15 wk. and the tumor incidence (after 14-20 wk.) was 78.6%. In mice exposed to fluorescent light (1000 lux) all day, tumors developed in 16 wk. and the incidence was 64.3%. In mice kept in darkness, tumors developed in 18 wk. and the incidence was 28.6%. In control mice kept under natural room light, tumors developed in 18 wk. and the incidence was 35.7%. The increased incidences of liver tumors in mice exposed to flashing or fluorescent light was attributed to a stress response to light. Within each group of animals, the mice developing liver tumors at the earliest times were not significantly different from the other mice (those developing tumors at later times or mice remaining without tumors) with respect to body wt. changes or the observed changes in the RBC and WBC levels.

69-1461 AFLATOXIN PRODUCED BY 1,626 ISOLATES OF *Aspergillus flavus* FROM GROUNDNUT KERNELS AND SOILS IN ISRAEL. (E.) Joffe, A. Z. (Hebrew U., Jerusalem). Nature (London) 221(5179):492, 1969.

69-1462 A SIMPLE DISPENSER FOR GENERATING DUST CLOUDS FROM STANDARD REFERENCE SAMPLES OF ASBESTOS. (E.) Timbrell, V. (Llandough Hosp. Penarth, Glamorgan, Scotland), A. W. Hyett and J. W. Skidmore. Ann. Occup. Hyg. 2(4):273-381, 1968.

69-1463 THE AIR TRANSPORT OF LEAD COMPOUNDS PRESENT IN AUTOMOBILE EXHAUST GASES. (E.) Cholak, J. (U. Cincinnati Sch. Med., Ohio), L. J. Schafer and D. Yeager. Amer. Industr. Hyg. Ass. J. 29(6):562-568, 1968.

69-1464 CHARACTERIZATION AND SOLUBILITY OF METALS ASSOCIATED WITH ASBESTOS FIBERS. (E.) Cralley, L. J. (Dept. Health, Ed., Wel., Cincinnati, Ohio), R. G. Keenan, R. E. Kupel, R. E. Kinser and J. R. Lynch. Amer. Industr. Hyg. Ass. J. 29(6):569-573, 1968.

69-1465 WATER SOLUBLE GUINEA PIG TRANSPLANTATION ANTIGEN FROM CARCINOGEN-INDUCED SARCOMAS. (E.) Kahan, B. D. (NIAID, Bethesda, Md.), E. C. Holmes, R. A. Reisfeld and D. L. Morton. J. Immun. 102(1):28-36, 1969.

69-1466 STRAIN DIFFERENCE AS TO TERATOGENICITY OF ETHYLURETHAN ON MOUSE EMBRYOS. (Jap.) Miyamoto, S. (Kyoto U., Japan). Kaibogaku Zasshi (Acta Anat. Nippon.) 43(5):378-383, 1968.

69-1467 A PRACTICAL TEST FOR CHEMICAL MUTAGENS IN MICE. (E.) Epstein, S. S. (Harvard Sch. Med., Boston, Mass.). Proc. Amer. Ass. Cancer Res. 10:22, 1969.

69-1468 MATHEMATICAL CONSIDERATIONS IN THE CARCINOGENICITY OF MULTIPLE SUB-CARCINOGENIC DOSES. (E.) Furst, A. (U. San Francisco, Calif.) and G. Ledin, Jr. Proc. Amer. Ass. Cancer Res. 10:28, 1969.

69-1469 TUMORIGENESIS IN RF MICE AS INFLUENCED BY CUMULATIVE DOSE OF DIETHYLNITROSAMINE (DEN). (E.) Clapp, N. K. (Paterson Labs., Manchester, England) and A. W. Craig. Proc. Amer. Ass. Cancer Res. 10:14, 1969.

69-1470 CARCINOGENICITY OF 2-(2-FORMYLHYDRAZINO)-4-(5-NITRO-2-FURYL)THIAZOLE (FNT) AND STRUCTURALLY RELATED COMPOUNDS. (E.) Cohen, S. M. (U. Wisconsin Sch. Med., Madison), J. M. Price, F. J. Ansfield and G. T. Bryan. Proc. Amer. Ass. Cancer Res. 10:15, 1969.

69-1471 PATHOGENESIS AND TRANSPLANTABILITY OF URINARY TRACT CARCINOMAS INDUCED BY

N-[4-(5-NITRO-2-FURYL)-2-THIAZOLYL]FORMAMIDE (FANFT). (E.) Ertürk, E. (U. Wisconsin Sch. Med., Madison), J. M. Price and G. T. Bryan. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:23, 1969.

69-1472 STRUCTURE-ACTIVITY RELATIONSHIPS OF N-DISUBSTITUTED ARYLHYDROXYLAMINES. (E.) Gutmann, H. R. (U. Minnesota, Minneapolis), C. C. Chen and D. Leaf. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:34, 1969.

69-1473 THE CONVERSION OF BENZPYRENE TO WATER-SOLUBLE DERIVATIVES IN HAMSTER EMBRYO CELL CULTURES. (E.) Diamond, L. (Wistar Inst., Philadelphia, Pa.). *Proc*. *Amer*. *Ass*. *Cancer* *Inst*. 10:19, 1969.

69-1474 *IN VITRO* TRANSFORMATION OF HAMSTER EMBRYO CELLS BY CARCINOGENIC HYDROCARBONS. (E.) DiPaolo, J. A. (NCI, Bethesda, Md.), P. Donovan and R. Nelson. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:20, 1969.

69-1475 EVALUATION OF NEOPLASTIC TRANSFORMATION *IN VITRO*. (E.) Goetz, I. E. (City Hope Med. Ctr., Duarte, Calif.), B. R. Hill and R. Kinosita. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:30, 1969.

69-1476 PLURIPOTENT ONCOGENICITY OF 1,1-DIPHENYL-2-PROPYNYL N-CYCLOHEXYL-CARBAMATE (I). (E.) Harris, P. N. (Eli Lilly Co., Indianapolis, Ind.), W. R. Gibson and R. D. Dillard. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:35, 1969.

69-1477 THE EFFECT OF TREATMENT WITH DMBA ON THE *IN VITRO* METABOLISM OF CHOLESTEROL BY RAT ADRENALS. (E.) Jull, J. W. (U. British Columbia, Vancouver, Canada), S. Coupey and B. Goudy. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:44, 1969.

69-1478 ARSENIC AS A CAUSE OF RESPIRATORY CANCER IN MAN: AN OCCUPATIONAL STUDY. (E.) Fraumeni, J. F., Jr. (NCI, Bethesda, Md.) and A. M. Lee. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:26, 1969.

69-1479 HIGH-SPEED FILMING TO DETECT MODIFICATION OF CILIARY ACTIVITY BY CHEMICAL CARCINOGENS IN A NEW BIOLOGICAL SYSTEM. (E.) Kasten, F. H. (Pasadena Found. Med. Res. Calif.), T. Okigaki and J. A. DiPaolo. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:45, 1969.

69-1480 HISTOCHEMICAL STUDY ON LIVER GLYCOGEN DURING AZO-DYE CARCINOGENESIS. (E.) Daoust, R. (U. Montreal, Canada) and A. Forget. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:17, 1969.

69-1481 *IN VIVO* BINDING OF ACETYLAMINOFLUORENE (AAF) TO RAT LIVER TRANSFER RNA. (E.) Agarwal, M. K. (Columbia U. Coll. Phys. Surg., New York, N. Y.) and I. B. Weinstein. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:2, 1969.

69-1482 LIVER CELL TURNOVER IN EARLY HEPATIC CARCINOGENESIS BY 2-ACETYLAMINOFLUORENE (AAF). (E.) Gardner, D. (New York U. Med. Ctr., N. Y.), R. Albert and W. Troll. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:28, 1969.

69-1483 BINDING OF N-HYDROXY-2-FLUORENYL-ACETAMIDE (N-OH-FAA) TO LIVER PROTEINS OF MALE RATS. (E.) Barry, E. J. (VA Hosp., Minneapolis, Minn.) and D. Malejka-Giganti. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:5, 1969.

69-1484 N-HYDROXY-2-ACETYLAMINOFLUORENE (N-HO-AAF) SULFOTRANSFERASE ACTIVITY *IN VITRO*, METHIONYL-BOUND AAF *IN VIVO*, AND CARCINOGENICITY OF N-HO-AAF IN RODENT LIVERS. (E.) DeBaun, J. R. (U. Wisconsin, Madison), E. C. Miller and J. A. Miller. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:18, 1969.

69-1485 ON THE MECHANISM OF BINDING OF N-HYDROXY-2-ACETYLAMINOFLUORENE (N-HO-AAF) TO RAT LIVER NUCLEIC ACIDS. (E.) Irving, C. C. (VA Hosp., Memphis, Tenn.), R. A. Veazey and L. T. Russell. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:43, 1969.

69-1486 ENZYMATIC ACTIVATION OF N-HYDROXY-2-FLUORENYLACETAMIDE (N-OH-FAA): STRUCTURES OF NUCLEIC ACID ADDUCTS. King, C. M. (Michael Reese Hosp. Med. Ctr. Chicago, Ill.) and B. Phillips. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:46, 1969.

69-1487 RESPONSIVENESS OF NORMAL, PRENEOPLASTIC, AND NEOPLASTIC RAT MAMMARY TISSUES TO MAMMARY GLAND GROWTH-REGULATORY MECHANISMS. (E.) Beuving, L. (U. California, Berkeley). *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:6, 1969.

69-1488 FURTHER STUDIES ON THE ROLE OF ALTERED THYROID FUNCTION ON EXPERIMENTALLY INDUCED BREAST CANCER IN SPRAGUE-DAWLEY RATS. (E.) Davidson, A. (U. North Carolina, Chapel Hill), J. Owen and C. G. Thomas, Jr. *Proc*. *Amer*. *Ass*. *Cancer* *Res*. 10:17, 1969.

69-1489 GROWTH CHARACTERISTICS AND MORPHOLOGY OF NEW LINES OF TRANSPLANTABLE RAT

MAMMARY TUMORS. (E.) Friedell, G. H. (U. Miami, Coral Gables, Fla.) and W. F. Dunning. Proc. Amer. Ass. Cancer Res. 10:27, 1969.

69-1490 CANCER OF THE UTERINE CERVIX INDUCED IN BALB/C MICE BY AN ANTI-FERTILITY DRUG. (E.) Dunn, T. B. (NCI, Bethesda, Md.). Proc. Amer. Ass. Cancer Res. 10:21, 1969.

69-1491 TRANSPLANTABLE SUBCUTANEOUS SARCOMAS OF MICE INDUCED BY CARCINOSTATIC ANTIBIOTICS, MITOMYCIN C AND ACTINOMYCIN S AND THEIR RESISTANCES TO THE TREATMENTS. (E.) Akamatsu, Y. (Med. Coll. Georgia, Augusta) and R. Ikegami. Proc. Amer. Ass. Cancer Res. 10:2, 1969.

69-1492 RELATIONSHIP BETWEEN LATENT PERIOD OF TUMOR INDUCTION AND ANTIGENIC STRENGTH. (E.) Bartlett, G. L. (Inst. Cancer Res., Philadelphia, Pa.) and R. T. Prehn. Proc. Amer. Ass. Cancer Res. 10:5, 1969.

69-1493 INFLUENCE OF POROSITY ON SARCOMA PRODUCTION BY SUBCUTANEOUS IMPLANTS. (E.) Brues, A. M. (Argonne Nat. Lab., Ill.), H. Auerbach, G. DeRoche and D. D. Grube. Proc. Amer. Ass. Cancer Res. 10:10, 1969.

69-1494 FOCUS OF SOLID-STATE CARCINOGENESIS. (E.) Bryson, G. (Cottage Hosp. Res. Inst., Santa Barbara, Calif.) and F. Bischoff. Proc. Amer. Ass. Cancer Res. 10:11, 1969.

69-1495 AZULENO[5,6,7-cd]PHENALENE, THE FIRST NON-AROMATIC CARCINOGENIC HYDROCARBON. (E.) Buu-Hoï, N. P. (Nat. Ctr. Sci. Res., Paris), N. B. Giao and Ch. Jutz. Proc. Amer. Ass. Cancer Res. 10:12, 1969.

69-1496 ENDOTOXIN'S INFLUENCE ON THE PRODUCTION OF SKIN PAPILLOMAS IN BALB C MICE WITH METHYLCHOLANTRENE. (E.) Henderson, J. S. (Rockefeller U., New York, N. Y.). Proc. Amer. Ass. Cancer Res. 10:37, 1969.

69-1497 INCORPORATION OF THYMIDINE, URIDINE AND LEUCINE IN THE SKIN OF MICE AFTER TREATMENT WITH CROTON OIL FACTOR A_1 (TPA). (E.) Hecker, E. (German Cancer Res. Ctr., Heidelberg) and H. Bresch. Proc. Amer. Ass. Cancer Res. 10:37, 1969.

69-1498 X-RAY AND X-RAY-PLUS-URETHANE INDUCTION OF "LEUKEMOGENIC" ACTIVITY IN TISSUES OF MICE: PRELIMINARY ELECTRON MICROSCOPIC STUDIES. (E.) Brown, R. C. (Oak Ridge Nat. Lab., Tenn.), V. Covelli, A. C. Upton and L. C. Satterfield. Proc. Amer. Ass. Cancer Res. 10:10, 1969.

69-1499 CELL-FREE PASSAGE OF CHEMICALLY INDUCED THYMIC LYMPHOMA IN C57BL MICE. (E.) Doell, R. G. (Stanford U., Calif.). Proc. Amer. Ass. Cancer Res. 10:20, 1969.

69-1500 CHANGES IN THE THYMOLYMPHOID AND MYELOID SYSTEMS OF THE MOUSE FOLLOWING A SINGLE INJECTION OF METHYLNITROSOUREA (MNUA). (E.) Frei, J. V. (U. Western Ontario, London). Proc. Amer. Ass. Cancer Res. 10:26, 1969.

69-1501 BEHAVIOR OF TUMOR PROMOTERS IN UNBURNED TOBACCO. (E.) Bock, F. G. (Roswell Park Mem. Inst., Buffalo, N. Y.). Proc. Amer. Ass. Cancer Res. 10:8, 1969.

69-1502 METABOLIC INHIBITION AND KILLING OF EHRLICH MOUSE ASCITES CANCER CELLS BY TOBACCO SMOKE IN RELATION TO CARCINOGENESIS AND SMOKE FILTER EVALUATION AND IMPROVEMENT. (E.) Burk, D. (NCI, Bethesda, Md.), T. Howard and D. Tiggelbeck. Proc. Amer. Ass. Cancer Res. 10:11, 1969.

See also abstract nos.: 1352,1356,1359,1360,1361,1362,1363,1631,1635,1636,1638

69-1503 EFFECT OF REOVIRUS TYPE 3 ON CULTURED BURKITT'S TUMOUR CELLS. (E.) Levy, J. A. (U. Pennsylvania Sch. Med., Philadelphia), G. Henle, W. Henle and B. A. Zajac. Nature (London) 220(5167):607-608, 1968.

Reovirus type 3 (RV-3) was added to 2 cell lines from the Burkitt lymphoma: EB3, which harbors the herpes-type virus (EBV) in 1-3% of the cells, and the EBV-free Raji line. The EB3 line was somewhat more resistant to RV-3 than the Raji line in the first few wk. of cultivation (possibly as a result of higher interferon synthesis), but after 8 wk. the course of RV-3 infection was about the same in both lines. RV-3 replication was seen in both lines, and persistent infection (the RV-3 carrier state) was readily induced and maintained. The EBV carrier state in the EB3 line was not enhanced by RV-3 infection. It is suggested that RV-3 and EBV did not play a concerted biological part, and that RV-3 did not act as a "helper" for EBV infection.

69-1504 RELATION BETWEEN EPSTEIN-BARR VIRAL AND CELL MEMBRANE IMMUNOFLUORESCENCE OF BURKITT TUMOR CELLS. I. DEPENDENCE OF CELL MEMBRANE IMMUNOFLUORESCENCE ON PRESENCE OF EB VIRUS. (E.) Klein, G. (Karolinska Inst., Stockholm), G. Pearson, J. S. Nadkarni, J. J. Nadkarni, E. Klein, G. Henle, W. Henle and P. Clifford. J. Exp. Med. 128(5):1011-1020, 1968.

Cells of the Burkitt lymphoma were examined by 2 immunofluorescent methods, 1 to detect membrane immunofluorescence (MIF; cell surface antigens) and the other to detect the proportion of cells producing the Epstein-Barr virus (EBV). In established cultures, MIF apparently depended on the presence of the EBV and the extent of the persistent viral infection; but since the results of the test were not consistent (some cultures showed MIF without EBV antigen-containing cells, or vice versa), it is suggested that 2 different antigens were involved. Young cultures and biopsy specimens showed strong MIF, but few of the cells were EBV-positive.

69-1505 RELATION BETWEEN EPSTEIN-BARR VIRAL AND CELL MEMBRANE IMMUNOFLUORESCENCE IN BURKITT TUMOR CELLS. II. COMPARISON OF CELLS AND SERA FROM PATIENTS WITH BURKITT'S LYMPHOMA AND INFECTIOUS MONONUCLEOSIS. (E.) Klein, G. (Karolinska Inst. Med. Sch., Stockholm), G. Pearson, G. Henle, W. Henle, V. Diehl and J. C. Niederman. J. Exp. Med. 128(5):1021-1030, 1968.

Blastoid cell cultures derived from peripheral WBC of pts. in the acute stage of infectious mononucleosis (IM) and harboring Epstein-Barr virus (EBV) in at least 1% of the cells, showed membrane antigens indistinguishable from those detected in cells of the Burkitt lymphoma (BL). Serum antibodies that reacted in indirect membrane immunofluorescence (MIF) tests with membrane antigens of live BL cells and IM WBC cultures were found in IM pts. Most sera collected before the onset of IM did not react in MIF tests with any of the several BL lines employed, but some sera reacted with cells of some (not all) of the BL cell lines. The antibodies involved in the MIF test were distinct from those responsible for the EBV and heterophile reactions. Max. MIF activity was attained long after the other 2 antibodies reached max. titers; antibodies to EBV and membrane antigens seemed to persist for several yr., whereas the heterophile reaction became negative in a few mo.

69-1506 ESTABLISHMENT OF CELL LINES FROM AUSTRALIAN LEUKAEMIC PATIENTS. PRESENCE OF A HERPES-LIKE VIRUS. (E.) Pope, J. H. (Queensland Inst. Med. Res., Brisbane, Australia). Aust. J. Exp. Biol. Med. Sci. 46(Pt. 5):643-645, 1968.

A herpes-like virus, distinct from Herpesvirus hominis, was found in 2 cell lines (predominantly primitive blast cells) established from peripheral WBC of 2 Australian pts. with acute myeloblastic or lymphoblastic leukemia. The cell lines were designated QIMR-WIL and QIMR-FIN, resp. The virus-like particles were indistinguishable from those described in cultured cells of the Burkitt lymphoma or of leukemic cells of African or U.S. origin. The virus observed caused no CPE in several cell lines of human or mammalian origin, and the cells induced no disease in suckling or weanling mice. QIMR-WIL cells were inoc. into rabbit cornea and chick embryo chorioallantoic membranes, with negative results. Neither cell line was infected with Mycoplasma.

69-1507 YABA TUMOR VIRUS. I. STUDIES ON PATHOGENESIS AND IMMUNITY. (E.) Behbehani, A. M. (U. Kansas Sch. Med., Kansas City), C. R. Bolano, P. S. Kamitsuka and H. A. Wenner. Proc. Soc. Exp. Biol. Med. 129(2):556-561, 1968.

In rhesus and cynomolgus monkeys inoc. i.v. or s.c. with Yaba virus (YV), the resulting tumors (histiocytomas) became grossly visible at about the same times after YV inoc. in both species, but a comparison of the ultimate tumor sizes, and the rates of development of complement-fixing (CF) antibodies, suggested that the cynomolgus monkeys were slightly more resistant to YV than the rhesus monkeys. No evidence of a direct transfer of YV from inoc. monkeys to their uninfected cagemates was found. No cross-resistance between YV and either of 2 other poxviruses (vaccinia or monkey pox) was demonstrated in vitro or in vivo. The fluorescent antibody method was more reliable than the CF method in detecting cytoplasmic YV antigen(s) in the early stages of tumor development (14 days after YV inoc.), but both tests were equally reliable in detecting YV antigen(s) in tumor cells removed 4 wk. or more after YV inoc.

69-1508 POSSIBILITY OF IN VITRO CULTIVATION OF A VIRAL AGENT CAUSING A LEUKOSIS-LIKE DISEASE IN MONKEYS. (Rus.) Adzhigitov, F. I. (Inst. Exp. Path. Ther., Sukhumi, USSR), B. A. Lapin, L. A. Iakovleva, V. A. Vasil'eva and O. Ia. Krivolapchuk. Vop. Virus. 13(4):454-457, 1968.

Inoc. of 9 cell lines (of human, rhesus monkey or hamster origin) with plasma or tissue homogenates from monkeys with symptoms of a transmissible leukosis-like disease, did not result in a CPE, detectable hemagglutination, or positive hemadsorption. No signs of virus production were seen even after serial passages of fluids from these inoc. cultures. Cultures inoc. with plasma from pts. with leukemia also failed to yield a virus. Thymus, spleen, lymph node and bone marrow cells from monkeys with symptoms of the leukosis-like disease survived in suspension culture for 6-10 days. Combined i.v., i.p. and intranasal inoc. of cells from these cultures (if they were no more than 5 days old) induced a leukosis-like disease in rhesus monkeys. A longer period of incubation of these suspension cultures resulted in inactivation of the agent. No signs of a virus were found when suspension cultures of organs from the infected monkeys were cocultivated with human embryonic cells.

69-1509 CONCENTRATION BY DIAFLO ULTRAFILTRATION OF MURINE LEUKEMIA AND SARCOMA VIRUSES GROWN IN TISSUE CULTURES. (E.) Rhim, J. S. (NIAID, Bethesda, Md.), L. B. Williams, Jr., R. J. Huebner and H. C. Turner. Cancer Res. 29(1):154-156, 1969.

Mouse leukemia viruses (Rauscher, Moloney, Friend, AKR) and a mouse sarcoma virus (Moloney), and the group-specific complement-fixing antigens shared in common by this group of viruses, were easily conc. quantitatively by ultrafiltration by Diaflo membranes.

69-1510 ACTIONS OF INTERFERON IN TISSUE CULTURES HARBORING MOUSE LEUKEMIA VIRUS. (E.) Sinkovics, J. G. (U. Texas M.D. Anderson Hosp. Tumor Inst., Houston), G. F. Groves and C. D. Howe. Experientia 24(9):927-928, 1968.

In the earlier passages of an established mouse spleen + thymus cell line, the CPE and replication of vesicular stomatitis virus (VSV) were not significantly altered by the presence of Rauscher leukemia virus (RLV), although the RLV-harboring cells showed a reduced response to interferon. When the RLV-containing cells underwent transformation (to a cell line inducing myxofibrosarcomas in newborn mice), VSV replication was delayed and its CPE was both delayed and altered. An RLV-containing cell line obtained from the myxofibrosarcoma showed the same response to VSV. In both of these transformed cell lines, interferon had little or no effect on the course of VSV infection. The results suggested that the presence of RLV in the transformed cultures was not primarily responsible for the changed course of VSV infection and the loss of interferon sensitivity, since RLV was present at a time when VSV infection was not affected, although interferon sensitivity was reduced (before the RSV-containing cells underwent transformation). It is suggested that the transformed cells adopted a new behavior towards an exogenous virus and interferon, either spontaneously or as a response to a defective sarcoma-inducing variant of RLV.

69-1511 ANTIGENIC CHARACTERISTICS OF LYMPHOMAS INDUCED BY RADIATION LEUKEMIA VIRUS (RADLV) IN MICE AND RATS. (E.) Ferrer, J. F. (Stanford U. Sch. Med., Palo Alto, Calif.) and H. S. Kaplan. Cancer Res. 28(12):2522-2528, 1968.

Intrathymic or i.p. inoc. of a cell-free extract of the radiation-induced C57BL/Ka mouse lymphoma, containing the radiation leukemia virus (RadLV), induced lymphosarcomas (morphologically identical to RadLV-induced mouse lymphomas) in newborn W/Fu rats. The antigenicity of the rat RadLV-induced lymphomas was demonstrated by their transplantation behavior (in adult W/Fu rats and in BALB/c, C3H/Km or C57BL/Ka mice) and their ability to induce the formation of cytotoxic antibodies. Sera from adult W/Fu rats immunized with RadLV-induced W/Fu rat lymphoma were specifically cytotoxic for all of the rat tumors and most of the mouse tumors induced by RadLV. Other cytotoxicity and adsorption studies showed identical or very closely related antigens in cells transformed by RadLV and the Gross mouse leukemia virus. The presence of RadLV cell-associated antigen in most radiation-induced mouse lymphomas suggested an etiologic role of RadLV in these tumors.

69-1512 IMMUNOLOGIC STUDIES ON GRAFFI-VIRUS-INFECTED SPONTANEOUS GROSS LEUKEMIA OF AKR MICE. (E.) Micheel, B. (German Acad. Sci., Berlin-Buch) and G. Pasternak. Int. J. Cancer 3(5):603-613, 1968.

Spontaneous Gross leukemias, repeatedly passaged in Graffi virus-infected mice, permanently produced Graffi virus, but only 1/10 of these leukemias was immunologically indistinguishable from Graffi leukemias (as shown by the presence of Graffi virus-induced surface antigens). The original Gross leukemias, transplanted independently, did not contain these antigens. The other 9 superinfected Gross leukemias were resistant to the rejection response of animals immunized against Graffi leukemia. The results of immunofluorescence tests suggested that the Graffi leukemia cells (as well as 1/10 of the Graffi virus-infected Gross leukemias) contained both viral and virus-induced new cellular antigens, whereas the other superinfected Gross leukemias contained only viral antigens.

69-1513 REQUIREMENT OF CELLULAR DNA SYNTHESIS FOR THE GROWTH OF FRIEND LEUKEMIA VIRUS. (E.) Yoshikura, H. (Nat. Inst. Health, Tokyo). Exp. Cell Res. 52(2-3):445-450, 1968.

In 2 lines of mouse cells (MLg and C3H2K), addition of cytosine arabinoside (a specific inhibitor of DNA synthesis) almost completely inhibited the growth of Friend leukemia virus (FLV) if added in the early stages of infection. Experiments using synchronized C3H2K cultures demonstrated that cellular DNA synthesis in the early stages of infection was a pre-requisite for the growth of FLV. Possible mechanisms for the role of cellular DNA synthesis in the replication of this RNA tumor virus are discussed.

69-1514 IMMUNOSUPPRESSION BY LEUKEMIA VIRUSES. I. EFFECT OF FRIEND DISEASE VIRUS ON CELLULAR AND HUMORAL HEMOLYSIN RESPONSES OF MICE TO A PRIMARY IMMUNIZATION WITH SHEEP ERYTHROCYTES. (E.) Ceglowski, W. S. (Temple U. Sch. Med., Philadelphia, Pa.) and H. Friedman. J. Immun. 101(3):594-604, 1968.

Friend leukemia virus (FLV) infection markedly inhibited the cellular and humoral immune responses to sheep RBC immunization in adult male BALB/c mice. The greatest immunosuppression was seen when FLV was inoc. prior to immunization. The appearance of splenomegaly (4 days after FLV infection) suggested FLV-induced dilution of antibody-forming cells with nonfunctional cells. Possible mechanisms for FLV-induced immunosuppression are discussed, including a direct or indirect action on stem cell function or division; competition with RBC antigens for the stem cell precursors; a direct or indirect action on 7S antibody-producing cells (the indirect action resulting from suppression of the 19S antibody-producing cells); or an infection or alteration of the macrophages, resulting in an inhibition of an intermediate stage in antibody biosynthesis.

69-1515 THE IMMUNODEPRESSIVE EFFECT OF FRIEND VIRUS. II. REDUCTION OF SPLENIC HAEMOLYSIN-PRODUCING CELLS IN PRIMARY AND SECONDARY RESPONSES. (E.) Wedderburn, N. (London Hosp. Med. Coll., England) and M. H. Salaman. Immunology 15(3):439-454, 1968.

Friend leukemia virus (FLV) infection markedly inhibited both the primary and the secondary immune responses to sheep RBC in adult Balb/c mice. The greatest immunosuppression was seen in mice inoc. with FLV 4 days before immunization. FLV inj., before or together with the antigen, markedly reduced the numbers of splenic IgM- and (to a greater extent) IgG-producing cells. Studies with ^{51}Cr-labeled sheep RBC demonstrated no reduction in RBC uptake after FLV infection; studies with formalin-inactivated FLV suggested that live FLV was required for immunosuppression, though a slight additional effect of antigenic competition was not ruled out. Immunosuppression induced by the Moloney leukemia virus appeared only when the mice became leukemic, 4-6 mo. after virus inj. In mice of the FLV-resistant C57Bl strain, FLV infection did not affect the immune response to sheep RBC. It is suggested that antibody-producing cells may be formed by 2 processes: an FLV-resistant stage (possibly involving the circulating small lymphocytes), occurring mainly in the early stages of the primary immune response, and an FLV-sensitive stage (possibly involving the non-circulating cells), apparent after day 2 of the primary response, and from the onset of the secondary response.

69-1516 CELLULAR ORIGIN OF A MOUSE LEUKEMIA VIRAL RIBONUCLEIC ACID. (E.) Wollmann, R. L. (U. Chicago, Ill.) and W. H. Kirsten. J. Virol. 2(11):1241-1248, 1968.

The RNA of mouse erythroblastosis virus, obtained from chronically infected C3H mouse embryo cells, was analyzed by sucrose density gradient centrifugation after RNase treatment. The RNA consisted of a rapidly sedimenting (72S) species and a component sedimenting more slowly, at 4-30S. Hybridization studies showed that the 72S RNA did not contain base sequences homologous to the DNA of the infected cells, but the slowly sedimenting RNA component (enclosed within the virus) showed base sequences homologous to DNA from infected and non-infected C3H mouse embryo cells.

69-1517 TRANSFORMATION BY MURINE SARCOMA VIRUS: FIXATION (DEOXYRIBONUCLEIC ACID SYNTHESIS) AND DEVELOPMENT. (E.) Nakata, Y. (NIH, Bethesda, Md.) and J. P. Bader. J. Virol. 2(11):1255-1261, 1968.

In rat embryo cells, transformation by mouse sarcoma virus (MSV) depended on the synthesis of DNA during the first 12 hr. of infection. Transformation did not take place when DNA synthesis was inhibited by thymidine or cytosine arabinoside. The existence of this 12-hr. critical time period, in which DNA synthesis was necessary for intracellular fixation of the MSV genome, was shown by the results of studies in which DNA synthesis was transiently suppresse before MSV infection or after a 12-hr. delay; under these conditions, little or no inhibition of transformation was noted. The development of the transformed cells after viral fixation was affected by cellular density; under conditions permitting fixation of the virus in confluent cellular monolayers, less than 20% of the cells developed into transformed foci.

69-1518 STUDIES ON THE FIXATION AND DEVELOPMENT OF CELLULAR TRANSFORMATION BY ROUS SARCOMA VIRUS. (E.) Nakata, Y. (NCI, Bethesda, Md.) and J. P. Bader. Virology 36(3): 401-410, 1968.

DNA inhibition by thymidine (20 mM) was used to confirm the requirement for DNA synthesis in the transformation of chick embryo cells by Rous sarcoma virus (RSV). Inhibition of DNA synthesis for 12 hr. after RSV exposure prevented subsequent transformation. Inhibition of DNA synthesis immediately before RSV exposure, or after a 12-hr. delay, had little effect on the number of resulting transformed foci. If DNA synthesis was continuously inhibited starting 12 hr. after RSV, transformation developed in the absence of cellular divisions, and transformed loci were comprised of 1 or 2 cells. Using mitotically synchronized cells, both daughter cells of an initially infected cell demonstrated transformation. The results indicated a fixation period requiring DNA synthesis for transformation by RSV, and showed that the RSV genome is duplicated within a single cellular generation (and distributed to both progeny at division); they also showed that transformation, once fixed, can develop in the absence of DNA synthesis.

69-1519 IN VITRO REPLICATION OF MOUSE SARCOMA VIRUS (MOLONEY STRAIN) IN BOVINE EMBRYO SKIN CELLS. (E.) Thomas, M. (St. Louis Hosp., Paris), M. Boiron, Y. Stoytchkov and J. Lasheret. Virology 36(3):514-518, 1968.

In bovine embryo skin cells, Moloney strain mouse sarcoma virus (MSV-M; obtained from BALB/c mouse tumors or supernatant fluid of a rat cell line) induced transformation after 7-12 days. MSV-M replication in these bovine cell cultures was demonstrated in several experiments. Titration curves on Swiss mouse embryo cells with supernatants of MSV-M infected bovine cell cultures suggested either that focus induction by the virus of bovine origin did not depend on the presence of Moloney leukemia virus (MLV) as a helper, or that MSV-M of bovine origin was defective but MLV was present (in large excess at any dilution) in the supernatants of infected bovine cultures.

69-1520 BIOLOGICAL AND SEROLOGICAL PROPERTIES OF VIRAL PARTICLES FROM A NONPRODUCER RAT NEOPLASM INDUCED BY MURINE SARCOMA VIRUS (MOLONEY). (E.) Ting, R. C. (NCI, Bethesda, Md.). J. Virol. 2(9):865-868, 1968.

The MSB-1 epithelial tumor, induced in a strain BN rat by Moloney mouse sarcoma virus (MSV), was described as a nonproducer rat neoplasm, but electron microscopic examination showed virus particles. These particles were biologically active in normal kidney cells from random-bred Osborne-Mendel rats. The virus was designated as MSV (O), and differed from other psuedotypes of MSV in its host range, antigenicity and interference pattern. Leukemia virus infection did not seem to interfere with the focus-forming ability of MSV (O) in rat cells. Rauscher pseudotype virus was not recovered after mixed infection of normal mouse embryo cells with MSV (O) and rat-adapted Rauscher leukemia virus.

69-1521 CHARACTERIZATION OF INTRACELLULAR RIBONUCLEIC ACID SPECIFIC FOR THE MURINE SARCOMA-LEUKEMIA VIRUS COMPLEX. (E.) Biswal, N. (Baylor U. Coll. Med., Houston, Tex.), M. B. Grizzard, R. M. McCombs and M. Benyesh-Melnick. J. Virol. 2(11):1346-1352, 1968.

The 78A1 line of rat embryo fibroblasts, transformed by the Moloney mouse sarcoma-leukemia virus complex, continuously produced virus particles. Measurable quantities of viral RNA could not be extracted from the cells (since most of the mature virions were found in the extracellular fluid and were not cell-associated). Viral RNA did accumulate within the cells, however, after treatment with a protein synthesis inhibitor (cycloheximide). This RNase-sensitive RNA showed a sedimentation coefficient of 71S, and the same base composition as the high molecular wt. RNA isolated from purified virions released by the transformed cells.

69-1522 EFFECTS OF ANTILYMPHOCYTE SERUM ON INDUCTION OF TUMOURS AND LEUKAEMIA BY MURINE SARCOMA VIRUS. (E.) Law, L. W. (NCI, Bethesda, Md.), R. C. Ting and A. C. Allison. Nature (London) 220(5167):611-612, 1968.

In adult female BALB/cAn mice, i.m. inoc. of MSV(MLV) (the sarcoma-inducing variant of Moloney leukemia virus) alone induced no tumors. In mice treated with MSV(MLV) and antilymphocyte serum (ALS), 8/20 developed atypical, apparently inflammatory muscular granulomas, and 8/20 (including 4/8 with granulomas) developed leukemia, after av. latent periods of 38.4 and 76 days, resp. The leukemias were transplantable into weanling BALB/c mice, but the granulomas were not. Virus-specific antigens of the transplantation type were found in both tumors, suggesting that tumor antigens and the host's immune status were important in tumor induction. This hypothesis was supported by the results of another experiment in BALB/c mice infected at birth with MLV; in these mice, the incidence of leukemia in ALS-treated mice was about the same as in untreated mice (48% and 57%, resp.). It is concluded that immunosuppression is a negligible factor where tolerance to MLV is known to develop.

69-1523 SUSCEPTIBILITY OF Praomys (Mastomys) natalensis TO THE MURINE SARCOMA VIRUS-HARVEY (MSV-H). (E.) Harvey, J. J. (London Hosp. Med. Coll., England). Int. J. Cancer 3(5):634-643, 1968.

In newborn Mastomys natalensis, splenic sarcomas induced (in 14/16 animals) by Harvey mouse sarcoma virus (MSV-H) developed more regularly, rapidly and extensively than MSV-H-induced splenic tumors in rats and mice. Sarcomas of the diaphragm, peritoneal wall and splenic mesentery developed in 4/16 infected Mastomys (suggesting that the splenic tumors were the primary lesions) and 2/16 also developed leukemia (reticulum cell type in 1/2, mixed lymphoblastic and erythroblastic in 1/2). MSV-H recovered from the plasma of infected Mastomys showed the same species specificity; it was fully infectious in newborn Mastomys and BALB/c mice. Newborn and weanling Mastomys did not develop leukemia up to 5 mo. after i.v. or i.p. inoc. of Friend mouse leukemia virus.

69-1524 THE DIFFERENTIAL ACTION OF NEONATAL THYMECTOMY IN MICE INFECTED WITH MURINE SARCOMA VIRUS-HARVEY (MSV-H). (E.) East, J. (Imp. Cancer Res. Fund, London N.W. 7) and J. J. Harvey. Int. J. Cancer 3(5):614-627, 1968.

The responses of newborn or 14-16-day-old C3H/Bi and BALB/c mice to Harvey mouse sarcoma virus (MSV-H) depended on their ages and the virus doses admin. In intact mice, the responses consisted of "early" erythroblastic splenomegaly, with severe anemia and sarcomas at the virus inj. site (this developed after 17-31 days in newborn mice inoc. with 0.1 ml of undiluted MSV-H, and later than this in older mice or animals admin. diluted virus), or "late" lymphocytic leukemia (the latent period was never less than 100 days). Neonatal thymectomy accelerated the erythroblastosis and increased the tumor incidence in the 14-16-day-old mice, but the mice did not develop lymphocytic leukemia during the observation period. A virus inducing only lymphocytic leukemia was isolated from the plasmas of leukemic intact or non-leukemic thymectomized mice. The results indicated that MSV-H behaved as a complex of 2 viruses, 1 causing the early changes, and a second (always present in higher conc., but with a slower action) causing the late changes.

69-1525 BIOPHYSICAL, BIOLOGICAL, AND CYTOCHEMICAL FEATURES OF A VIRUS ASSOCIATED WITH TRANSPLANTABLE HAMSTER TUMORS. (E.) Stenback, W. A. (Baylor Univ. Coll. Med., Houston, Tex.), G. L. Van Hoosier, Jr. and J. J. Trentin. J. Virol. 2(10):1115-1121, 1968.

The D-9 hamster lymphoma contained large numbers of budding C particles (resembling those of mouse leukemia viruses) and "Bernhard" type particles, but plasma pellets from infected hamsters and supernatant fluids from cultured D-9 cells contained only the C particles. This virus did not induce tumors in hamsters (even at high conc.), and preliminary attempts to infect various hamster cells in tissue culture failed. A cell line from a virus-containing tumor, releasing large quantities of the virus into the supernatant fluid by budding, was established. Results of several analytical procedures indicated that this virus probably contains single-stranded RNA. This virus did not show specific cross-reactivity with several mouse leukemia viruses in complement fixation tests.

69-1526 VIRUS-LIKE PARTICLES IN ROUS RAT SARCOMA. (E.) Lindberg, L. G. (U. Lund, Sweden). Acta Path. Microbiol. Scand. 74(2):189-198, 1968.

In 3/5 rat sarcomas (varying in age up to 5 mo.) induced by the Schmidt-Ruppin strain of Rous sarcoma virus (RSV), sparse intracellular virus-like particles were observed by electron microscopy. These particles were morphologically similar to the avian sarcoma-leukosis group. Similar particles were observed at the site of the inj. RSV. No virus-like particles were found in hemorrhagic cysts induced by RSV or in serially transferred sarcomas. Homogenates from rat sarcomas did not induce tumors in chickens and no infectious virus was found in tissues at the inj. site after 3 days. However, homogenized tissue excised from the inj. site 1 day after RSV inj. in rats induced sarcomas in chickens.

69-1527 RELATIONSHIPS OF CHROMOSOMAL AND PATHOLOGICAL FINDINGS IN ROUS SARCOMA VIRUS-INDUCED TUMOURS IN THE MOUSE. (E.) Mark, J. (U. Lund, Sweden). Int. J. Cancer 3(5):663-682, 1968.

In neonatal CBA mice, Rous sarcoma virus (Schmidt-Ruppin strain) induced sarcomas in 45%, 65% and 85% after 6, 12, and 24 mo., resp. Small tumors with a slow growth rate and high histological maturity usually showed a normal diploid stemline karyotype, while the large, rapidly growing and histologically immature tumors usually showed a numerically and structurally changed chromosome stemline (tetraploid type). Metastases were seen in approx. 33% and involved only the lungs; no lymph node cysts were seen, although some animals developed cysts in the spleen, near the pancreas or in association with the sarcomas. Acid mucopolysaccharides were found in 48/48 tumors studied. Using back-transfer to chickens, Rous sarcomas were elicited by about 75% of the mouse sarcomas studied; nearly all of the mouse tumors proving negative in this respect had latent periods of over 1 yr.

69-1528 VIRUS PRODUCTION IN TUMORS FORMED IN MICE AFTER INJECTION OF SYNGENEIC TISSUE CULTURE CELLS INFECTED WITH ROUS SARCOMA VIRUS. (Rus.) Kriukova, I. N. (Gamaleia Inst. Epidem. Microb., USSR Acad Med. Sci., Moscow) and I. B. Obukh. Vop. Onkol. 14(10):55-60, 1968.

Cell cultures from Af mouse embryos, infected with the Carr-Zilber strain of Rous sarcoma virus (RSV), induced Rous sarcomas in adult Af mice and synthesized the group-specific complement-fixing antigen, but did not produce infectious RSV. RSV production was studied in 12 mouse sarcomas (designated IAf through XIIAf) at different passage levels, after i.m. inoc. of tumor homogenates, cell-free preparations or cell suspensions into 5-10-day-old chicks. Only 2/12 primary mouse tumors induced sarcomas in chicks, but the tumors became virogenic after several mouse passages (RSV production did not decrease after up to 15 mouse passages) and induced sarcomas in chicks. A cell-free preparation of 1 mouse sarcoma (passage 5 of IAf) induced sarcomas in chickens, but not in mice. Sarcomas induced in chickens by homogenates of IAf (passage 5) induced sarcomas in adult mice after inoc. of tumor homogenates; the tumors in these recipient mice contained RSV-specific antigens. Homogenates of chicken sarcomas induced by the IAf mouse sarcoma also induced tumors in 5-day-old or 3-wk.-old mice; the tumors in these recipient mice contained RSV antigens, but not polyoma virus antigens. The results indicated an alteration of the biological properties of RSV by this serial passage procedure; the original Carr-Zilber strain of RSV, after successive mouse and chick passages, did not induce tumors after 1 inj. in either suckling or adult mice.

69-1529 BRAIN TUMORS INDUCED WITH ROUS SARCOMA VIRUS, SCHMIDT-RUPPIN STRAIN. I. INDUCTION OF BRAIN TUMORS IN ADULT MICE WITH ROUS CHICKEN SARCOMA CELLS. (E.) Kumanishi, T. (U. Tokyo, Japan). Jap. J. Exp. Med. 37(5): 461-474, 1967.

Wing web tumors, induced in chickens by Rous sarcoma virus (RSV; Schmidt-Ruppin strain) or back-transfers of RSV-induced mouse ascites sarcomas, were inoc. intracerebrally (i.c.) into mice of several strains. In 4-wk.-old mice of strains C3H/He, DDD or C57BL/6, i.c. inoc. of RSV-induced wing web tumor cells resulted in brain tumors in 55-80%; the incidence in CDF$_1$ mice was only 20%. In older mice, the brain tumor incidence was lower but the latent period was about the same. This tumor material, however, did not induce tumors after i.p. or s.c. inoc. into adult mice, even at 5-fold doses. Experiments with wing web tumors induced by back-transferred RSV-induced mouse sarcomas gave variable results; the highest tumor incidence and the shortest latent period were noted in mice inoc. i.c. with wing web tumor cells from the SR-C3H/He mouse ascites sarcoma. These brain tumors were transplantable (s.c.) into adult mice of syngeneic, but not allogeneic, strains.

69-1530 EXPERIMENTAL INDUCTION OF BRAIN TUMORS BY INTRACEREBRAL INOCULATION OF ROUS SARCOMA VIRUS IN NEWBORN RHESUS MONKEYS. (Ger.) Jänisch, W. (Path. Inst., Erfurt, Germany), K. H. Horn, P. Scholtze and D. Schreiber. Exp. Path. 2(4):226-235, 1968.

Of 8 newborn rhesus monkeys inj. intracerebrally with suspensions of the Schmidt-Ruppin strain of Rous sarcoma virus (0.5-1.5 ml into the left cerebral hemisphere; 4/8 also received 1 s.c. inj. of 1.5 ml), 3/8 developed intracranial tumors (1 reticulum cell sarcoma of the cerebral meninges, 1 spindle cell sarcoma of the dura, 1 adventitial sarcoma of the left frontoparietal part of the brain) within 20-40 days, and 1/3 also developed multiple s.c. spindle cell sarcomas. One other animal of this group (alive 4 mo. after virus inoc.) developed an extracranial tumor, probably a sarcoma. It is suggested that viruses may play a part in the etiology of tumors of the central nervous system in humans.

69-1531 ELECTRON MICROSCOPY OF A HERPES VIRUS ASSOCIATED WITH THE AGENT OF MAREK'S DISEASE IN CELL CULTURE. (E.) Nazerian, K. (USDA Reg. Poul. Res. Lab., East Lansing, Mich.) and B. R. Burmester. Cancer Res. 28(12):2454-2462, 1968.

Duck embryo fibroblast cultures, inoc. with blood from chickens infected with the JM strain of Marek's disease (avian leukosis), showed a CPE after 11-25 days; many of the polykaryocytes associated with this CPE showed DNA-containing intranuclear inclusion bodies. The morphogenesis and morphology of the virus-like particles isolated from infected cultures were similar to those of herpes-type viruses.

69-1532 ELECTRON MICROSCOPIC LOCALIZATION OF HERPESVIRUS-TYPE PARTICLES IN MAREK'S DISEASE. (E.) Ahmed, M. (Pfizer & Co., Inc., Maywood, N. J.) and G. Schidlovsky. J. Virol. 2(12):1443-1457, 1968.

Clusters of refractile, rounded cells appeared consistently in cell cultures of chicken lymphoid tumors induced by the Georgia isolate of Marek's disease (avian leukosis). Mature, immature, enveloped and empty herpes virus (HV)-type particles, usually associated with smaller particles, were observed in the nuclei of all rounded cells in the affected areas. Cytoplasmic inclusions containing mature, enveloped virus particles were also seen in the rounded cells. Fibroblasts growing in the vicinity of the CPE area often contained a few HV-type particles. The original tumors showed no virus particles before in vitro cultivation. The virus in infected cultures was always cell-associated. Control cell cultures developed no rounded cells and demonstrated no virus particles of any type.

69-1533 RNA WITH AMINO ACID-ACCEPTOR ACTIVITY ISOLATED FROM AN ONCOGENIC VIRUS. (E.) Trávniček, M. (Czechoslovak Acad. Sci., Prague). Biochim. Biophys. Acta 166(3):757-759, 1968.

The amino acid acceptor activity of RNA isolated from avian myeloblastosis virus (BAI Strain A), after treatment with snake venom phosphodiesterase (to destroy all acceptor activity), indicated that molecules of transfer RNA (tRNA) present in the virus preparations were not susceptible to enzymatic attack. Labeled RNA ^{14}C-leucyl-tRNA from leukemic myeloblasts, mixed with crude virus and subjected to standard purification procedures, showed no tendency for tRNA to bind or be associated with the virus. It is concluded that tRNA was an integral part of the virus. Comparison of amino acid acceptor activities (using 15 different amino acids) of viral and cellular tRNA's showed viral tRNA acceptor activity for 14/15 amino acids (the exception was glutamic acid), while specific activities for viral and cellular tRNA differed markedly according to the amino acid used, suggesting that viral tRNA was not of cellular origin.

69-1534 SUSCEPTIBILITY TO INFECTION WITH VARIOUS VIRUSES AS A CRITERION FOR THE DETECTION OF CONTAMINATION BY AVIAN LEUKOSIS VIRUSES IN CHICK EMBRYOS. (Rus.) Romanov, K. P. (Sci. Res. Inst. Oncol., USSR Min. Health, Moscow) and O. K. Kuznetsov. Vop. Onkol. 14(10):112-113, 1968.

The presence of contaminating avian leukosis viruses (ALV) in chick embryo cells used for vaccine production is usually detected by cellular resistance to transformation by Rous sarcoma virus (RSV). An attempt was made to devise a simpler test, based on the susceptibility of uncontaminated chick embryo cells to infection with vaccinia, mumps, Newcastle disease or vesicular stomatitis virus. The cultures were infected at different passage levels with these viruses and with RSV. After 3 passages, the multiplication of the other viruses was unchanged, but susceptibility to RSV transformation was significantly reduced. When cell cultures known to be free of ALV were treated with culture fluids from passages 5 or 6 of the tested cell cultures, then infected with the non-oncogenic viruses, the multiplication of these viruses was suppressed by a factor of about 10 (by comparison to untreated control cultures). This test was not believed to be sufficient for the detection of ALV contamination, however.

69-1535 EARLY STEP IN SENDAI VIRUS-MEDIATED RESCUE OF ROUS SARCOMA VIRUS FROM VIROGENIC MAMMALIAN CELLS. (E.) Svoboda, J. (Czechoslovak Acad. Sci., Prague) and O. Machala. J. Virol. 2(9):951-952, 1968.

Conditions under which Sendai virus (SV) enabled the rescue of Rous sarcoma virus (RSV) were studied in mixed suspensions of virogenic, RSV-transformed Chinese hamster cells and chicken fibroblasts from primary cultures. The results demonstrated that the first critical step for obtaining RSV release was agglutination of both cell types by SV; this was followed by the formation of cytoplasmic bridges and cell fusion. Agglutination by phytohemagglutinin did not result in RSV rescue.

69-1536 VARIATION IN SUSCEPTIBILITY OF CHICK EMBRYO TISSUES TO INFECTION WITH ROUS SARCOMA VIRUS IN VITRO. (E.) Bather, R. (U. Saskatchewan, Saskatoon, Canada), A. Wong and P. R. Sweeny. Canad. J. Microbiol. 14(10):1164-1167, 1968.

Second-generation whole-embryo cultures from 9-day-old chick embryos were more susceptible to infection by Rous sarcoma virus (RSV) than cultures from younger or older embryos. Second-generation limb bud cells yielded the highest proportion of infected cells, and kidney cells the lowest (48 hr. after infection in vitro); somite cells showed intermediate RSV susceptibility. When tissues from 9-day-old embryos were used for the in vitro assay of 3 strains of RSV, limb bud cells yielded slightly higher focus counts in each case than whole embryo, somite cultures (approx. 0.5 log higher) or kidney cells (approx. 2.0 logs higher). Limb bud cultures showed less tendency to clump, and the foci were more easily counted than in cultures from other tissues.

69-1537 ULTRASTRUCTURE OF THE SURFACES OF CELLS INFECTED WITH AVIAN LEUKOSIS-SARCOMA VIRUSES. (E.) Morgan, H. R. (Inst. Cancer Res., Villejuif, France). J. Virology 2(1):1133-1146, 1968.

Chick embryo fibroblasts infected with various strains of Rous sarcoma virus (RSV) and avian leukosis viruses (RAV-1 and RAV-3) showed an increase in the acid mucopolysaccharide layer (AMPS) at the surface upon staining with ruthenium red (RR); the highest increase was seen with the Fujinami strain of RSV. The thickness of the AMPS layer was not correlated with the degree of loss of contact inhibition exhibited by infected cells. Phosphotungstic and chromic acid (PTA-CR) staining of the cell envelope indicated the presence of glycoproteins; the outer surface of the virions showed the same staining as the cell surface with RR and PTA-CR. The RR cell layer was incorporated into the structure of the budding virus particle. Since the RR layers and virions appeared to fuse, as did the RR layers between virus particles, it is hypothesized that these layers play a role in virus particle aggregation and in their adherence to the cell surface.

69-1538 PRODUCTION OF INTERFERON-LIKE INHIBITOR INDUCED BY EXTRACT FROM ROUS SARCOMA. I. INHIBITION OF ROUS SARCOMA VIRUS INFECTION AND PROPERTIES OF THE INHIBITOR PRODUCED. (E.) Watanabe, M. (Fukushima Med. Coll., Japan). Biken J. 11(2):91-94, 1968.

Chick embryo cells treated with RNA (100-250 µg/ml) from Rous sarcoma tissues (obtained from chick embryos) showed a reduced susceptibility to Rous sarcoma virus (RSV; Bryan's high titer strain) infection. The RNA preparation induced the production of an inhibitor of RSV growth (which was reduced by 50%) which was released into the culture medium. The inducing substance was resistant to RNase and DNase. The inhibitor was non-dialyzable (at pH 2 or after 56° C heat treatment for 20 min.) and was destroyed by trypsin or bacterial proteinase; it is concluded that the inhibitor acted as an interferon.

69-1539 PRODUCTION OF INTERFERON-LIKE INHIBITOR INDUCED BY EXTRACT FROM ROUS SARCOMA. II. PROPERTIES OF THE INDUCER IN THE EXTRACT. (E.) Sato, M. (Osaka Pref. Inst. Pub. Health, Japan) and M. Watanabe. Biken J. 11(2):95-100, 1968.

A phenol extract of Rous sarcoma tissue (formed on the chick embryo chorioallantoic membrane) contained a substance inducing the production of an interferon-like inhibitor of Rous sarcoma virus infection in chick embryo cells. Chemical analysis indicated the presence of this hyaluronidase-sensitive substance in the polysaccharide fraction of the extract fractionation and physicochemical studies indicated that the inducing substance was a hyaluronic acid or a closely related compound.

69-1540 SUSCEPTIBILITY OF DUCKLINGS TO DIFFERENT STRAINS OF ROUS SARCOMA VIRUS AND TO OTHER AVIAN TUMOUR VIRUSES. (E.) Smida, J. (Cancer Res. Inst., Bratislava, Czechoslovakia), V. Thurzo and V. Smidová. Neoplasma (Bratisl.) 15(4):329-337, 1968.

The Bryan standard, Prague and Schmidt-Ruppin strains of Rous sarcoma virus (BS-RSV, PR-RSV and SR-RSV, resp.), Fujinami sarcoma virus (FSV), Mill Hill #2 reticuloendothelioma virus (MH2V), B77 chicken sarcoma virus (B77V), and BAI strain A avian myeloblastosis virus (AMV), isolated from chickens, were inoc. into 1-day-old White Peking ducklings. FSV and SR-RSV had the strongest tumorigenic activity, while PR-RSV and B77V had to be inj. in larger doses to cause tumors. BS-RSV, MH2V and AMV did not induce tumors in ducklings. The rate of tumor regression was greater in ducklings than in chickens. No neutralizing antibodies were seen in the sera of "negative" ducklings infected with BS-RSV and AMV; antibody levels were high in sera of ducklings in which the B77V- and FSV-induced tumors had regressed, and somewhat lower in ducklings in which SR-RSV tumors had regressed (indicating the weak antigenicity of SR-RSV). The virulence of B77V was not enhanced by serial passage in ducklings; no adaptation of the virus to the new host was noted.

69-1541 PROPAGATION OF B77 VIRUS AND THREE STRAINS OF ROUS SARCOMA VIRUS IN JAPANESE QUAIL. (E.) Smida, J. (Cancer Res. Inst., Bratislava, Czechoslovakia) and V. Smidová. Neoplasma (Bratisl.) 15(4):439-441, 1968.

The Bryan standard, Schmidt-Ruppin and Purdy strains of Rous sarcoma virus (BS-RSV, SR-RSV and PU-RSV, resp.) and B77 sarcoma virus (B77V) were inj. into the wing web of 60-90-day-old Japanese quail. BS-RSV was the most active tumor-inducer tested. Tumors induced by B77V and BS-RSV gave similar virus yields/g tumor tissue. SR-RSV and PU-RSV had low tumor-inducing capacities in quail. BS-RSV could be propagated for 3 successive passages and B77V for 2 passages in quail, but SR-RSV and PU-RSV failed to infect quail in the second passage. It is concluded that these avian tumor virus strains are less active in the Japanese quail than in chickens of the same age.

69-1542 IN VITRO CULTIVATION OF THE MOUSE MAMMARY TUMOR VIRUS: REPLICATION OF MTV IN TISSUE CULTURE. (E.) Cardiff, R. D. (U. California, Berkeley), P. B. Blair and K. B. DeOme. Virology 36(2):313-317, 1968.

A method for the isolation of labeled mammary tumor virus (MTV) from MTV-infected cultures of mammary tumors from female BALB/cfC3HCrgl mice, continuously labeled with ^{3}H-uridine, is described. The results demonstrated an increasing rate of release of the isotope (as mature MTV) for 38 hr. after addition of the label; the rate of isotope release then leveled off at 280 cpm/hr. Cultures producing MTV at max. rates also produced, within 12 hr., enough physical particles to produce a light-scattering band and a positive MTV antigen test (using a rabbit antiserum to MTV). Although most cell cultures apparently had a finite life span, MTV yield was quantitatively similar in primary and secondary cultures, and in cultures 5 and 40 days old.

69-1543 SOME REMARKS ON THE MORPHOLOGY OF VIRUS PARTICLES OF THE B TYPE AND THEIR ISOLATION FROM MAMMARY TUMORS. (E.) Calafat, J. (Netherlands Cancer Inst., Amsterdam) and P. Hageman. Virology 36(2):308-312, 1968.

Mammary tumor virus B particles from mammary tissues, mammary tumors and milk of 3 mouse strains (C3H/HeA, C3Hf/A, and BALB/cfC3H/A) were morphologically identical. Virus preparations from C3H and BALB/cfC3H tumors showed very good tumor-inducing capacities in force-bred BALB/c females (mammary tumors developed in 20/20 and 11/13 mice, resp., at av. ages of 183 and 171 days, resp.).

69-1544 THE MAMMARY TUMOR VIRUS IN ORGANS OF MICE: NORMAL DISTRIBUTION AND POST-INOCULATION LOCALIZATION. (E.) Ritter, R. I. (U. California, Berkeley) and S. Nandi. Proc. Soc. Exp. Biol. Med. 129(2):502-504, 1968.

The distribution of mammary tumor virus (MTV) in the early and late stages of infection was studied by the mammary nodule bioassay in 3-wk.-old female mice of the MTV-free BALB/cCrgl strain, inoc. with blood or bearing transplanted organs (spleen, liver, thymus, mammary gland, lymph node, bone marrow) from 8-wk.-old histocompatible female donors infected with MTV. When the donors were of the MTV-positive BALB/cfC3H/Crgl strain, the blood and all organs tested showed MTV activity. When the donors were BALB/cCrgl mice in the early stages of MTV infection (3 days after MTV inoc.), the highest MTV activity was demonstrated in the spleen, followed by the bone marrow and lymph nodes; little activity was noted in the blood, and none in the other organs tested.

69-1545 SPECIFIC SOLUBLE ANTIGEN IN NORMAL AND MALIGNANT TISSUES CONTAINING THE MAMMARY TUMOR VIRUS. (Rus.) Karamova, E. R. (Inst. Epidem. Microbiol. Acad. Med. Sci. USSR, Moscow). Vop. Virus. 13(5):605-611, 1968.

A specific antigen was detected by agar gel precipitation (using a specific rabbit antiserum) in mammary gland and mammary tumor tissue from mice of mammary tumor virus (MTV)-positive strains (C3H, A, or some inbred lines), but not in other organs from these mice. The conc. of the antigen was higher in the tumor tissue than in the normal mammary tissue. Mammary glands of mice of MTV-free strains, and mammary tumors transplanted into MTV-free mice (C57Bl), did not contain this antigen. After sucrose extraction and ultracentrifugation (30,000 x g for 90 min.), the antigen was found in the sediment; after saline extraction and ultracentrifugation (105,000 x g for 90 min.), it remained in the supernatant fluid. It is suggested that this antigen is a soluble component of MTV, or that its synthesis in the mammary gland is induced by MTV.

69-1546 NONVIRUS-ASSOCIATED ANTIGENS IN VIRUS-INDUCED MOUSE MAMMARY TUMORS. (E.) Vaage, J. (U. California, Berkeley). Cancer Res. 28(12):2477-2483, 1968.

The immunogenicity of spontaneous C3H mammary carcinomas was studied in several experiments in mammary tumor virus (MTV)-infected C3H mice and MTV-free C3Hf mice. The results showed that mouse mammary tumors contained a common component which was immunogenic in MTV-free mice, but not in MTV-infected mice. Some tumors also contained tumor-specific antigens, unrelated to the MTV, which rendered them immunogenic in the MTV-infected mice.

69-1547 SPONTANEOUS MAMMARY ADENOCARCINOMA IN MICE: INFLUENCE OF THYMECTOMY AND RECONSTITUTION WITH THYMUS GRAFTS OR SPLEEN CELLS. (E.) Yunis, E. J. (U. Minnesota, Minneapolis), C. Martinez, J. Smith, O. Stutman and R. A. Good. Cancer Res. 29(1):174-178, 1969.

Neonatally thymectomized C3H MTV+ (mammary tumor virus-positive) female mice, implanted 1 wk. after surgery with syngeneic MTV+ or MTV- thymus grafts, had about the same mammary tumor incidence as sham-operated controls (79%, 83% and 81%, resp.) and a similar mean age at tumor onset (321, 337 and 298 days, resp.). Neonatally thymectomized C3H MTV+ females, inj. with spleen cells from syngeneic MTV+ mice, had a lower tumor incidence (35%) and a longer latent period (mean, 419 days) than animals inj. with spleen cells from syngeneic MTV- mice (60% incidence, 326 days mean latency). Three possible mechanisms to explain the role of the thymus in spontaneous mammary carcinoma development in mice were suggested. The thymus may provide a necessary site for MTV latency and/or replication; it may have as yet unknown endocrine functions or endocrine interactions with other organs; or the intact thymus is necessary for a "balanced" virus-host tumor cell immune interaction, in a process of tolerance to the virus and/or virus-induced antigen(s).

69-1548 SITE OF GENETIC REGULATION ON HYPOPHYSIAL GRAFT-INDUCED MAMMARY GLAND DEVELOPMENT. (E.) Bardin, C. W. (Baylor U. Coll. Med., Houston, Texas), A. G. Liebelt and R. A. Liebelt. J. Nat. Cancer Inst. 41(6): 1453-1461, 1968.

In virgin female (RIII x A)F_1 or (RIII x C57BL)F_1 mice bearing isologous pituitary grafts (PG) and transplanted with PG-sensitive (RIII) or PG-resistant (A or C57BL) mammary tissue, the patterns of lobuloalveolar development seen in the mammary grafts indicated that the resistance or sensitivity of the mammary glands to PG-induced development depends in part on the genetic constitution of the mammary tissue. The A or C57BL mammary implants in PG-bearing F_1 hybrids showed a significantly greater development than A and C57BL *in situ* mammary glands in PG-bearing hosts. This unexpected finding suggested that host factors (a hormonal stimulus or the mammary tumor virus) influence the extent of strain-dependent lobuloalveolar development.

69-1549 INDUCTION OF DNA SYNTHESIS BY ADENOVIRUSES IN CONTACT-INHIBITED HAMSTER CELLS. (E.) Shimojo, H. (Nat. Inst. Health, Tokyo) and T. Yamashita. *Virology* 36(3): 422-433, 1968.

In contact-inhibited hamster embryo cell cultures, induction of DNA synthesis by human adenoviruses was most efficient with the highly oncogenic types (12 and 31). With the weakly oncogenic (types 3 and 7) or non-oncogenic adenoviruses (types 2 and 5), DNA synthesis occurred later and was longer-lasting than with types 12 and 31. Adenovirus types 2 and 5 replicated in hamster cells, whereas types 12, 31, 3 and 7 did not.

69-1550 PERSISTENCE OF THE VIRAL GENOME IN ADENOVIRUS TYPE 12-INFECTED HAMSTER CELLS. (E.) Zur Hausen, H. (U. Pennsylvania, Philadelphia). *J. Virol.* 2(9):918-924, 1968.

All Nil-2 line Syrian hamster cells infected with adenovirus type 12 (AV-12; input multiplicity of 10) revealed T antigen when counted 1 or 2 days after infection; the percentage of fluorescent cells diminished after day 3 and decreased with each subculture by a factor of about 2. When cellular growth was inhibited by 5-fluoro-2'-deoxyuridine (FUDR), fluorescent cells persisted for at least 2 wk. In studies with ^{3}H-labeled AV-12, a gradual reduction in labeled nuclear loci was noted, parallel to the decrease in T antigen-containing cells. In nongrowing cultures, no change in labeled loci was noted. Fluorescent cells contained an av. of 10 times more silver grains than nonfluorescent cells.

69-1551 CHROMOSOMAL ABERRATIONS AND CLONING EFFICIENCY IN ADENOVIRUS TYPE 12-INFECTED HAMSTER CELLS. (E.) Zur Hausen, H. (U. Pennsylvania, Philadelphia). *J. Virol.* 2(9):915-917, 1968.

In Syrian hamster cells (Nil-2 line) abortively infected with nonirradiated or UV-irradiated adenovirus type 12 (AV-12; input multiplicity 0.1-100) and examined after 24 hr., the capacity of AV-12 to induce chromosomal aberrations was more resistant to UV inactivation than its ability to induce T antigens. An inverse correlation was found between the capacity of the virus to induce T antigens and chromosomal aberrations, and the cloning efficiency of the infected cells. The virus did not inhibit DNA synthesis in hamster cells at the input multiplicities used.

69-1552 *IN VITRO* TRANSFORMATION OF HAMSTER EMBRYONIC KIDNEY CULTURES EXPOSED TO HUMAN ADENOVIRUS 12. (E.) Pétursson, G. (U. Iceland, Reykjavik), D. Armstrong, E. De Harven and J. Fogh. *Cancer Res.* 29(1):145-153, 1969.

Human adenovirus type 12 (AV-12) transformed hamster embryonic kidney cells within 5 wk. No infectious virus was detected in passage 7 of these transformed cells; passage 27 cells induced undifferentiated malignant tumors (at the site of s.c. inoc.) in 13/15 newborn and 4/5 weanling hamsters, after a 26-day latent period. These hamster tumors, when re-established *in vitro*, were morphologically identical to the transformed cells. Tumor-bearing hamsters showed no antibodies to the AV-12 complement-fixing tumor antigen. No virus-specific tumor antigens were found in the transformed cells or in the hamster tumors.

69-1553 A SIMPLE PURIFICATION PROCEDURE FOR ADENOVIRUS TYPE 12 T AND TUMOR ANTIGENS AND SOME OF THEIR PROPERTIES. (E.) Tockstein, G. (St. Louis U. Sch. Med., Mo.), H. Polasa, M. Pina and M. Green. *Virology* 36(3):377-386, 1968.

Human adenovirus type 12 (AV-12) "T" and tumor antigens were present mostly in the isolated nuclear fraction of AV-12-infected KB (human cancer) cells and AV-12-transformed hamster embryo cells. Sucrose gradient centrifugation and polyacrylamide gel electrophoresis demonstrated 3 and 4 antigenic components in chromatographically purified "T" and tumor antigen preparations, resp.; it is not known whether these represent different forms of the same protein or different viral-coded proteins. Purified preparations of "T" and tumor antigen did not stimulate DNA synthesis in contact-inhibited mouse 3T3 cells. They did not possess thymidine kinase, DNA or RNA polymerase, RNase, or DNase activities. They did not alter thymidine kinase, DNA polymerase, and "DNA synthesizing enzyme" system activities in cell-free extracts, or RNA polymerase activities in isolated nuclei.

69-1554 STUDIES ON ADENOVIRUS-12-CARCINOGENESIS BY TISSUE CULTURE. I. VIRUS ISOLATION

FROM HAMSTER TISSUES INOCULATED WITH ADENOVIRUS TYPE 12. (Jap.) Motoi, M. (Okayama U. Med. Sch., Japan). *Saibokaku Byorigaku Zasshi* (*J. Karyopath.*) 12(1):19-26, 1968.

Adenovirus type 12 (AV-12) carcinogenesis was studied using virus isolation from hamster tissues or hamster tissue culture cells. Tumors developed in newborn hamsters after i.p. and intracerebral (i.c.) AV-12 inoc., but no morphological transformation was observed in cultured cells exposed to AV-12. No virus was recovered from hamster tissue at any time following 6 hr. after i.p. inj. or 3 days after i.c. inj. Virus was recovered from the medium of the first 3 medium changes of cultured hamster cells inoc. with AV-12, but not thereafter. It is concluded that AV-12 replication did not take place in these hamster cells.

69-1555 STUDIES ON ADENOVIRUS-12-CARCINOGENESIS BY TISSUE CULTURE. II. *IN VITRO* TRANSFORMATION OF HAMSTER CELLS BY *ADENOVIRUS* TYPE 12. (Jap.) Motoi, M. (Okayama U. Med. Sch., Japan). *Saibokaku Byorigaku Zasshi* (*J. Karyopath.*) 12(1):27-34, 1968.

In vitro transformation of hamster cells by human *adenovirus* type 12 (AV-12) is discussed. In cultures of trypsin-dispersed cells from the peritoneal tissue and brain of hamsters inoc. i.p. and intracerebrally with AV-12, resp., transformation was observed in 2/4 peritoneal cell cultures, but not in the brain cell culture. In primary cultures of hamster kidney, peritoneal tissue and whole embryo inoc. with AV-12, transformation was observed in the cultures of peritoneal tissue and whole embryo, but not in the kidney cultures. All transformed cells were morphologically small and epithelioid.

69-1556 STUDIES ON ADENOVIRUS-12-CARCINOGENESIS BY TISSUE CULTURE. III. CHARACTERS OF HAMSTER CELLS TRANSFORMED *IN VITRO* BY ADENOVIRUS TYPE 12. (Jap.) Motoi, M. (Okayama U. Med. Sch., Japan). *Saibokaku Byorigaku Zasshi* (*J. Karyopath.*) 12(1):35-42, 1968.

Hamster cell cultures transformed *in vitro* by adenovirus type 12 (AV-12) induced tumors when inoc. i.p. into young adult hamsters. These tumors were histologically similar to tumors produced by AV-12 inoc. in newborn hamsters. AV-12 could not be recovered from these transformed cells. Complement fixation tests demonstrated specific T antigen in the tumors induced by transplantation of these transformed cells. Most cells in 3 transformed cell lines showed karyotypes in the diploid range, but aneuploidy, polyploidy and a few structural aberrations were present.

69-1557 DEVELOPMENT OF TUMOR IN SPINAL CANAL OF HAMSTERS INOCULATED WITH ADENOVIRUS TYPE 12. (Jap.) Matsuura, K. (Okayama U. Med. Sch., Japan). *Saibokaku Byorigaku Zasshi* (*J. Karyopath.*) 12(1):43-55, 1968.

In newborn hamsters, intracranial inoc. of adenovirus type 12 (AV-12) induced spinal canal tumors in 17/67 (25.4%). In 1 group observed until death (40-55 days), the tumor incidence was 11/39 (28.2%). Some spinal canal tumors developed by downward extension of intracranial tumors (with or without intracranial symptoms) through the central canal or the subarachnoid space, and seemed to be induced by penetration of the AV-12 soln. into these areas. The morphology and tumor cell arrangements of these tumors were identical to those reported for intracranial, peripheral (s.c. tissue) or thoraco-abdominal cavity tumors induced by AV-12. It is suggested that the mother cells of these tumors originate in embryonic undifferentiated neuroectodermal cells.

69-1558 TUMOR INDUCTION BY ADENOVIRUS TYPE 12 IN CENTRAL NERVOUS SYSTEM OF C_3Hf/Bi MICE. (Jap.) Endoh, T. (Okayama U. Med. Sch., Japan). *Saibokaku Byorigaku Zasshi* (*J. Karyopath.*) 12(1):57-72, 1968.

Intracranial inoc. of adenovirus type 12 (AV-12) induced CNS tumors in 13/45 newborn C_3Hf/Bi mice that were observed for over 55 days; these mice died of tumors 71-167 days after AV-12 inoc. Mice developing intraspinal tumors died earlier than those with intracranial tumors. All spinal canal tumors characteristically arose from the curvature between the cervical and thoracic vertebrae; the brain tumors developed in the frontal areas or fourth ventricle. The well-differentiated tumors showed epithelial characteristics (trabecular, palisade and/or rosette-like structures), although they were arranged in sarcoma-like patterns. Since these histological pictures are essentially the same as those observed in hamster tumors, it is suggested that the CNS tumors induced in these mice originated from neuroectodermal supporting cells. A small proportion of the tumors histologically resembled human medulloblastoma, glioblastoma multiforme or spongioblastoma.

69-1559 ADENOVIRUS TYPE 12 ONCOGENICITY IN NEWBORN HAMSTERS: THE EFFECT OF POKEWEED MITOGEN. (E.) Haase, A. T. (NIH, Bethesda, Md.), J. A. Kasel and L. N. Chessin. *J. Immun.* 101(4):806-807, 1968.

In hamsters inoc. i.p. with adenovirus type 12 (AV-12; Huie strain) at age 72 hr., the tumor incidence 3 mo. later was 85%. In hamsters treated with pokeweed (*Phytolacca americana*) mitogen (PWM) at birth and with AV-12 at age 72 hr., the tumor incidence after 3 mo. was only 23%. PWM-treated animals showed transient transformation of the lymphocytes and peripheral lymphocytosis for up to 72 hr. after PWM admin., but the peripheral blood picture thereafter was the same as in controls inoc. with AV-12 only. It is suggested that PWM accelerated the development of immune competence in these animals (which were thereafter able to reject AV-12-transformed cells), or that PWM incorporation into the tumor target cells may have prevented subsequent AV-12 transformation.

69-1560 APPLICATION OF PASSIVE HEMAGGLUTINATION METHODS FOR DETECTION OF ANTIBODY TO VIRAL ANTIGEN IN HAMSTERS BEARING ADENOVIRUS TYPE 12 TUMORS. (E.) Lefkowitz, S. S. (Med. Coll. Georgia, Augusta). J. Immun. 101(3):611-616, 1968.

Purified adenovirus type 12 (AV-12) antigen, isolated from AV-12-infected HeLa cells, was coated on tanned sheep RBC. These sensitized RBC agglutinated with antiviral guinea pig and rabbit sera, and with sera from hamsters with AV-12 induced tumors. Addition of cytosine arabinoside to the AV-12-infected HeLa cell monolayers, prevented the synthesis of this RBC-sensitizing antigen, but not the synthesis of "T" antigen, as determined by complement fixation (CF) tests. Hamster sera containing antibody to AV-12 antigens, as detected by passive hemagglutination (PH) methods, were also positive by CF methods. About 50% of the hamsters with primary tumors and 25% of the animals with transplanted tumors, synthesized antibody to AV-12 antigens. A good correlation was seen between the results of CF and PH tests. The tumor and "T" antigens did not react by PH.

69-1561 EFFECT OF GONADECTOMY ON ADENOVIRUS-12 ONCOGENESIS IN SYRIAN HAMSTERS. (E.) McFarlane, E. S. (Dalhousie U., Halifax, N. S., Canada) and J. A. Embil, Jr. Canad. J. Microbiol. 14(9):1013-1014, 1968.

In Syrian hamsters inoc. s.c. with adenovirus type 12 (AV-12) within 24 hr. after birth, the tumor incidence in the survivors (180 days later) was 15% in males and 90% in females, after latent periods of 50-150 and 30-90 days, resp. Sham-operated controls inoc. with AV-12 showed the same tumor incidence. In orchiectomized (orx.) males and oophorectomized (oox.) females, the incidences of AV-12-induced tumors (in animals recovering from the operation) were 38% and 42%, resp., after latent periods of 76-182 and 40-108 days, resp. No tumors developed in orx. or oox. animals not inoc. with AV-12. It is suggested that a virus-cell interaction may take place *in vivo* in both sexes, but that tumor development *may* require a growth factor (such as estrogens).

69-1562 VIRAL TUMOR INDUCTION: IMPORTANCE OF SEX AND ROUTE OF INOCULATION. (E.) Schell, K. (NIH, Bethesda, Md.) and W. T. Lane. Lab. Anim. Care 18(5):513-519, 1968.

In several experiments using newborn and 6-day-old Syrian golden hamsters inoc. with adenovirus type 12 (AV-12), SV40 or an AV-12/SV40 hybrid, the tumor incidence and latent period depended on the routes of virus inoc. (best results were seen after i.p. or simultaneous i.p. and s.c. virus inoc., by comparison to the results of s.c. inoc. alone), virus dosages and sex. SV40-induced tumors appeared later than tumors induced by AV-12 or the hybrid virus. At very small virus doses, the tumor responses seemed to be greater in males than in females. At virus doses inducing tumors within 5-7 wk., the tumor responses were greater in females than in males. At high virus doses, no sex difference was noted. The rate of tumor development may have been an expression of the endocrine environment (sexual development, thymus function and adrenocortical involution), and an immune response controlled by the amount of antigen recognized and (to a large extent) by the hormonal fluctuations seen in the neonatal period. It is suggested that the lowered tumor response in males, under some conditions, resulted from the action of local factors at the site of tumor development, whereas the late-appearing resistance in females was related to the earlier maturation of the immune mechanism seen in females.

69-1563 ONCOGENICITY OF MONKEY ADENOVIRUSES IN HAMSTERS. (Rus.) Tsetlin, E. M. (Tarasevich Inst. Med. Biol. Prep., Moscow), N. N. Dodonova, A. D. Al'tshtein, N. N. Vasil'eva, I. S. Levenbuk and A. E. Chigirinskii. Vop. Onkol. 14(12):44-50, 1968.

The previously reported oncogenicity of monkey adenoviruses SA7 (C8) and SV20 in newborn hamsters was confirmed. In newborn hamsters, s.c. inoc. of adenoviruses SA7 (B105) and SA7 (C626), from cercopithecus monkeys, induced s.c. tumors (poorly differentiated sarcomas) after 77-148 days. These tumors were transplantable into adult hamsters, but the growth rates were relatively slow in adult hosts. No virus could be recovered, either from the tumors themselves or from tumor cells cocultivated with monkey kidney cells, but complement fixation tests demonstrated "tumor" antigens. The tumor antigens from tumors induced by SA7 (C8) did not cross-react with tumor antigens from SA7 (B105)- or SA7 (C626)-induced tumors. The SA7 (C8) virus induced tumors in hamsters after s.c., i.m., i.p., intracerebral or intrapulmonary inoc.; its minimum oncogenic dose was 300-1000 PFU. Newborn hamsters were most sensitive to this virus, but tumors could be induced in hamsters up to 2 wk. old.

69-1564 TRANSFORMATION OF NEWBORN HAMSTER CELLS WITH SIMIAN ADENOVIRUS SA7. (E.) Whitcutt, J. M. (Polio Res. Found., Johannesburg, South Africa) and J. H. S. Gear. Int. J. Cancer 3(3):566-571, 1968.

Skin cells from newborn hamsters were transformed within 6-8 days after addition of simian adenovirus SA7; 20-50 macroscopic foci of transformation were seen after 14 days. Newborn hamster kidney cells were less readily transformed by SA7; the first foci of transformation appeared after 6-13 days, and a few additional foci were seen within 21 days. The fibroblast-like cells appeared to be chiefly involved in SA7 transformation. All tests for infectious SA7 in the transformed cultures were negative. Transformed skin and kidney cell cultures (inoc. s.c.) induced mixed spindle cell and round cell sarcomas in 9/10 and 3/3 weanling hamsters, resp., within 40 days.

69-1565 STUDIES ON THE ONCOGENICITY OF BOVINE ADENOVIRUS TYPE 3. (E.) Darbyshire, J. H. (Cent. Vet. Lab., New Haw, Weybridge, Surrey, England), L. D. Berman, F. C. Chesterman and H. G. Pereira. Int. J. Cancer 3(5):546-557, 1968.

Bovine adenovirus type 3 (BAV-3; WBR 1 strain) did not induce tumors in newborn CGA mice. In newborn Syrian hamsters, the tumor types induced by BAV-3 (inoc. s.c., i.p., intracerebrally or intrathoracically) depended on the virus dose. High doses (admin. s.c., but not by the other routes) induced hemorrhagic cysts, often associated with hard plaques of tumor cells, at the inj. sites; the latent periods were short (less than 1 mo.). Lower doses induced invasive, solid tumors (histologically resembling the tumors induced in hamsters by primate adenoviruses) after latent periods of at least 1 mo. The solid tumors were transplantable and could be established as non-virus-producing tissue culture lines, but the cystic tumors could not be passaged in vitro or in vivo. These 2 tumor types might have been induced by 2 different agents, but some evidence suggested that only 1 agent was present in the BAV-3 preparation. All hamsters inoc. with BAV-3 (including adults and neonatally inoc. animals not developing tumors) showed complement-fixing, immunodiffusing and neutralizing antiviral antibodies, and adults also showed classical transplantation immunity. Antibody responses to "T" antigen were not consistently demonstrated.

69-1566 IN VITRO TRANSFORMATION BY AN AVIAN ADENOVIRUS (CELO). I. HAMSTER-EMBRYO FIBROBLASTIC CULTURES. (E.) Anderson, J. (U. Rhode Island, Kingston), V. J. Yates, V. Jasty and L. O. Mancini. J. Nat. Cancer Inst. 42(1):1-7, 1969.

Chicken-embryo-lethal-orphan (CELO) virus transformed hamster embryo fibroblasts in vitro. Earliest alterations in cell morphology and growth pattern were noted 24 hr. after infection. The cells showed a disorganized growth pattern, with little or no parallel arrangement; approx. 50% of the cell population assumed a pyramidal or stellate morphology. After 4 passages, fibroblastic elements gave way to epithelioid-like cells. From passages 7-12, most cells were stellate and contained oval or rounded nuclei; later, multinucleated giant cells appeared and nuclear heterogenicity increased. Virus production decreased as the number of transformed cells increased. Immunofluorescent techniques demonstrated a virus-specific intranuclear "T" antigen in most cells. Cells from passage 7, inoc. s.c. into 3-4-wk.-old hamsters, produced well-circumscribed fibrosarcomas in 5/7 animals after a latent period of 21 days; cells from passage 12 produced tumors in 6/8 animals after 34 days. No tumors developed in hamsters inoc. with control cells and observed for 6 mo.

69-1567 EFFECT OF 5-FLUOROURACIL AND 5-BROMO-2'-DEOXYURIDINE ON THE INDUCTION OF THYMIDINE KINASE IN POLYOMA VIRUS-INFECTED MOUSE EMBRYO CELLS. (E.) Žemla, J. (Czechoslovak Acad. Sci., Bratislava, Czechoslovakia). Biochem. Biophys. Res. Commun. 33(1):69-73, 1968.

Primary cultures of mouse embryo cells were pretreated with 5-fluorouracil (FU; 10 μg/ml for 24 hr.), then infected with polyoma SE virus (PV; 2-20 PFU/cell for 3 hr.). After removal of PV, the cells were exposed to FU (10 μg/ml) + 5-bromo-2'-deoxyuridine (BUDR; 100 μg/ml) for 3 days at 37° C. In PV-infected cultures not treated with FU or BUDR, thymidine (TdR) kinase activity reached a peak 24 hr. after infection, then decreased sharply to zero at 72 hr. after infection. In non-infected control cultures, TdR kinase activity varied with time, but some activity was detectable after 72 hr. TdR kinase activity was induced in infected cells treated with FU + BUDR. These cells showed a higher "starting" TdR kinase level than untreated, infected cells. The peak was lower and delayed, and the subsequent decline was slower. The results showed that TdR kinase can be induced by PV in the absence of normal PV replication, in mouse embryo cells.

69-1568 POLYOMA VIRUS REPLICATION IN ASCITIC CELLS. (E.) Nordenskjöld, B. (Karolinska Inst., Stockholm 60). Int. J. Cancer 3(5):628-633, 1968.

Sensitivity to polyoma virus (PV) infection was found in 3/14 ascites mouse tumors: 2/2 PV-induced sarcomas (SEWA clone 10 and SEYF, showing little or no spontaneous PV release) and 1/3 sarcomas induced by 3-methylcholanthrene (MC; the MSWB sarcoma). In these 3 tumors, PV sensitivity was correlated with the number of surviving cells and the appearance of antiviral antibodies in the serum. PV production and the number of infected cells increased exponentially for 50-100 hr. after PV inoc., then either remained stationary or fell. A reduction in PV recovery was paralleled by the appearance of antiviral antibodies. Since the total number of cells in the peritoneal cavity either remained stationary or fell, PV may have acted as an oncolytic virus for these tumors. The other tumors studied, proving resistant to all PV titers tested, were 1 Moloney virus-induced lymphoma (YAC), 3 MC-induced tumors (MC1A and MDAY sarcomas and L-1210 lymphoma), 2 lymphomas induced by 7,12-dimethylbenzanthracene or estradiol (EL4 and 6C3HED, resp.), and 5 "spontaneous" tumors (Krebs-2 tumor, WL4 lymphoma, and the Ehrlich, S3A and TA3 mammary carcinomas).

69-1569 ANCHORAGE AND GROWTH REGULATION IN NORMAL AND VIRUS-TRANSFORMED CELLS. (E.) Stoker, M. (U. Glasgow, Scotland), C. O'Neill S. Berryman and V. Waxman. Int. J. Cancer 3(5):683-693, 1968.

Suspension cultures of an "anchorage-dependent" line of hamster cells (BHK 21) and an "anchorage-independent," polyoma virus-transformed derivative (PyH3) were studied. The results showed that the suspension medium was not itself inhibitory, but that the anchorage-dependent cells required a rigid surface of adequate size for colony formation. In methylcellulose gel suspensions in agar-lined vessels, both cell types showed an increase in cell size and continued DNA synthesis for the first 24 hr. The PyH3 cells continued to grow into colonies thereafter. The BHK 21 cells showed almost complete cessation of growth and DNA synthesis after 24 hr., but remained competent for further growth for at least 1 wk. in the suspension cultures. When these cells were allowed to attach to a rigid surface and then exposed to colchicine, the results showed that the suspended cells had been blocked between mitosis and the end of the S phase of the mitotic cycle.

69-1570 ONCOGENIC ACTION OF A STRAIN OF POLYOMA VIRUS IN WHITE SWISS MICE (HISTOLOGICAL DATA). (It.) Iorio, A. (U. Perugia, Italy), R. Pileri and M. Pitzurra. Boll. Soc. Ital. Biol. Sper. 44(8):796-798, 1968.

Newborn Swiss mice were inoc. with polyoma virus (PV), and the tumor incidence was studied in the animals surviving weaning; some were sacrificed 10-15 mo. after PV inoc. and the others were followed until death. Of these mice, 3 developed no grossly or microscopically visible tumors; 12 clinically healthy animals showed 19 microscopically visible tumors, and 27 mice showed 45 grossly visible tumors. Lung tumors were seen in about 65%, liver and kidney tumors in 34% each, tumors of the heart, intestine and parotid gland in 1% each, thyroid tumors in 0.5% (2 mice), and s.c. tumors in 3 mice. No tumors involving the spleen were found. Four histological types were noted: hemangiomas (mostly of the lung and liver, but sometimes of other organs), fibromas (s.c. tissue only), adenomas (kidney cortex, thyroid, parotid and intestine), and lymphatic tumors (liver, lung and parotid). It is concluded that PV can induce tumors of both the mesenchymal and the ectodermal tissues.

69-1571 IMMUNOLOGIC ANALYSIS OF THE SERA OF HAMSTERS INFECTED WITH POLYOMA VIRUS. I. SEROLOGIC STUDIES IN POLYOMA VIRUS INFECTION. (E.) Porwit-Bóbr, Z. (Med. Acad, Cracow, Poland), W. Ptak, Z. Przybyłkiewicz and W. Jaszcz. Arch. Immun. Ther. Exp. 16(4):558-567, 1968.

Hemagglutination inhibition (HI) titers were studied in golden hamsters inoc. (s.c.) neonatally with polyoma virus (PV), the mothers of some of these animals, and 4-8-wk.-old hamsters with s.c. inoc. PV-induced tumors. Serum HI titers were high in PV-inoc. hamsters with or without hemorrhagic or neoplastic lesions, and in the mothers of animals remaining in contact with the PV-infected offspring for 14-34 days (but not for less than 14 or more than 34 days; these females showed no morphological signs of PV infection). The HI titers were low in untreated controls, animals in the late stages of PV infection, and animals with tumors limited to the s.c. inoc. site. The HI activity of the sera of PV-infected hamsters was the sum of the activities of thermostable and thermolabile inhibitors and antibodies; low HI titers were associated with a thermostable inhibitor. Increased levels of nonspecific inhibitors during PV infection may result from contact of the host with infectious PV, or from a systemic reaction to the growth and destruction of tissues.

69-1572 HAMSTER INTERFERONS INDUCED BY POLYOMA VIRUS. (E.) Tálas, M. (Hungarian Acad. Sci., Budapest), G. Weiszfeiler and L. Bátkai. Acta Virol. (Praha) [Eng.] 12(4):378-380, 1968.

Interferons inhibiting Chikungunya virus synthesis were found in primary cultures of hamster embryonic cells and peritoneal macrophages infected with polyoma virus (PV). Accumulation of interferon was parallel to a slight increase in hemaglutinating virus titer, and reached max. levels 5 days after inoc. of cells with the virus. The interferons were species-specific, stable at pH 2, and not destroyed by treatment with trypsin or by RNase + DNase. The highest biological activity of PV-stimulated interferon was found in fractions corresponding to a molecular wt. of 21,500-24,000. Peritoneal exudate cells from uninfected hamsters (obtained 4-5 days after mobilization of starch) contained low titers of interferon.

69-1573 EVIDENCE OF SV40-SPECIFIC TRANSPLANTATION AND SURFACE ANTIGENS IN CELLS TRANSFORMED BY PARA-ADENOVIRUS 12. (E.) Lausch, R. N. (Baylor U. Coll. Med., Houston, Tex.),

S. S. Tevethia and F. Rapp. J. Immun. 101(4):645-649, 1968.

The presence of viral determinants in cells from a tumor induced in newborn hamsters by a PARA-adenovirus 12 population carrying SV40 information was studied. The cells contained the SV40-specific transplantation, surface and tumor ("T") antigens. These cells had a higher level of "T" antigen but a lower level of transplantation antigen than cells from the SV40-induced H-50 hamster tumor. The PARA-12 cells contained no evidence for any adenovirus markers, and did not synthesize infectious virus.

69-1574 ORGANIZATIONAL DIFFERENCE OF CELL SURFACE "HEMATOSIDE" IN NORMAL AND VIRALLY TRANSFORMED CELLS. (E.) Hakomori, S. (U. Washington Sch. Med., Seattle), C. Teather and H. Andrews. Biochem. Biophys. Res. Commun. 33(4):563-568, 1968.

The contents of "hematosides" ("N-acetyl-" and "N-glycosylhematoside"), lactosylceramide and glucosylceramide on the cell surface were studied in normal mouse, hamster or human fibroblasts, and in derivatives of these cells transformed by SV40, polyoma or Rous sarcoma viruses. All transformed cells, irrespective of their origins or the transforming viruses used, showed reduced hematoside contents (with a corresponding increase in the relative contents of lactosyl- and glucosylceramide), demonstrating the "incomplete" nature of the carbohydrate chains on their cell surfaces. Results of trypsinization experiments indicated that the hematosides present on the surfaces of the normal cells were masked by some trypsin-removable protein substance, whereas the hematosides of the transformed cells were unmasked. In both cell types, the glycosides were firmly bound to the cells and could not be released by trypsin.

69-1575 MEMBRANE GLYCOPROTEIN BIOSYNTHESIS: CHANGES IN LEVELS OF GLYCOSYL TRANSFERASES IN FIBROBLASTS TRANSFORMED BY ONCOGENIC VIRUSES. (E.) Bosmann, H. B. (U. Rochester, N. Y.), A. Hagopian and E. H. Eylar. J. Cell. Physiol. 72(2,Pt.1):81-88, 1968.

In mouse embryo fibroblast lines transformed by polyoma virus (PV), simian virus 40 (SV40) or PV + SV40, the activities of 4 membrane glycoprotein: glycosyl transferases, responsible for the synthesis of membrane glycoproteins, were more than double the activities seen in normal mouse embryo fibroblasts. The greatest increase in these enzyme activities (especially polypeptide: N-acetylgalactosaminyl transferase and glycoprotein:galactosyl transferase) was seen in the PV + SV40-transformed cell line (SV-PY-3T3). These increases in glycoprotein:glycosyl transferase activity did not result from changed levels of glycosidase activity.

69-1576 EFFECT OF PROLONGED PASSAGE OF CELLS FROM HAMSTER TUMORS INDUCED BY SIMIAN VIRUS 40 ON THE ISOLATION OF ONCOGENIC VIRUS AND ON SUPERINFECTION. (Rus.) Talash, M. (Hungarian Acad. Sci., Budapest). Vop. Virus. 13(4): 457-461, 1968.

Four cell lines from SV40-induced hamster tumors were passaged in tissue culture or in 3-4-wk.-old hamsters (by s.c. inoc.). Cocultivation of the cells from each passage (with susceptible monkey kidney cells) demonstrated continued production of infectious SV40 in 10-11 successive in vitro or in vivo passages of 2/2 cell lines originally yielding SV40. One strain, originally failing to yield SV40, produced small amounts of infectious virus at irregular intervals of in vivo or in vitro passage. These 3 cell lines became approx. 100 times more resistant to superinfection by SV40 (as determined by a comparison of the levels of newly synthesized virus) after 15 successive passages; however, since the amounts of infectious virus released (in cocultivation studies) varied widely from 1 passage to another, it could not be determined whether this increased resistance to superinfection resulted from selection of cells containing SV40 information. The fourth cell line, originally producing no SV40, remained SV40-negative throughout the study; its susceptibility to superinfection remained unchanged throughout 25 successive passages in vivo and 30 passages in vitro.

69-1577 HISTOPATHOLOGY OF SARCOMAS INDUCED IN HAMSTERS BY CLONES OF IN-VITRO SV40-TRANSFORMED HOMOLOGOUS HEART CELLS. ATTEMPTS TO CORRELATE MORPHOLOGIC FEATURES AND DEGREE OF ONCOGENIC POTENTIAL. (E.) Diamandopoulos, G. Th. (Harvard Med. Sch., Boston, Mass.). Amer. J. Path. 53(5):753-767, 1968.

The tumor-inducing capacities of 16 clones, obtained from a tumor-inducing SV40-transformed hamster heart cell line, varied from 1 clone to another. The in vitro and in vivo morphological characteristics of these clones also varied widely. No correlation was seen between tumor morphology (in vitro or in vivo) and the oncogenic potential (OP; defined as the minimal number of cells inducing sarcomas in 50% of homologous animals) of any of the clones. The only parameter showing a consistent parallel with the OP of any clone, was its ability to give rise to metastases. Other parameters such as tumor growth rate, mitotic activity and invasiveness, when considered together, were also correlated with the OP of a given clone. The wide spectrum of morphological features (both in vitro and in vivo) supported the contention that the transformable target cell is the major determining factor (if not the only determining factor) in the morphogenesis of SV40-induced tumors.

69-1578 DEVELOPMENT OF 3T3-LIKE LINES FROM Balb/c MOUSE EMBRYO CULTURES:

TRANSFORMATION SUSCEPTIBILITY TO SV40. (E.) aronson, S. A. (NIH, Bethesda, Md.) and G. J. odaro. J. Cell. Physiol. 72(2,Pt.1):141-148, 968.

ethods for the development of several low aturation density cell lines (designated Balb/3T3) and several high saturation density cell lines (designated Balb/3T12), from Balb/c mouse mbryos, are described. All cell lines were ypotetraploid. The Balb/3T3 lines were similar to 3T3 cells (derived from random-bred Swiss ouse embryo cultures) in morphology, ability to row at high dilution, low saturation density, and high susceptibility to SV40 transformation. The Balb/3T12 lines (continually maintained at igh cell density) showed little improvement in cloning efficiency with passage; SV40 infection roduced transformants that could be selected by the formation of colonies at low cell densities. The susceptibilities of Balb/3T3 and Balb/3T12 cells to SV40-induced "T" antigen induction and transformation were comparable.

9-1579 BASIS FOR THE ACQUISITION OF MALIGNANT POTENTIAL BY MOUSE CELLS CULTIVATED IN VITRO. (E.) Aaronson, S. A. (NCI, Bethesda, Md.) and G. J. Todaro. Science 162(3857): 1024-1026, 1968.

Cell lines from Balb/c mouse embryos, grown in tissue culture for over 200 generations under conditions minimizing cell-cell contact (designated Balb/3T3), did not induce tumors in newborn or irradiated weanling Balb/c mice. When the cell lines were cultivated under conditions permitting extensive cell-cell contact (Balb/3T12 lines), they became tumor-inducing within 30 generations. The tissue culture property showing the best correlation with tumor-inducing capacity was the loss of contact inhibition of cell division. SV40 transformation resulted in the development of tumorigenicity in non-tumor-inducing Balb/3T3 lines, but the tumors induced by transplanted SV40-transformed cells often regressed spontaneously. SV40 transformation reduced the tumor-inducing capacity of Balb/3T12 cells. This change in malignancy was attributed to the increased antigenicity of the SV40-transformed cells.

69-1580 ENHANCEMENT BY IUDR OF TRANSFORMATION OF HAMSTER KIDNEY CELLS BY SV40 VIRUS. (Heb.) Ashkenazi, A. (Kaplan Hosp., Rehovot, Israel). Harefuah 75(11):446-448, 503, 1968.

In hamster kidney cells infected with SV40 (undiluted or at various dilutions), addition of 5-iodo-2'-deoxyuridine (IUDR; 40 µg/culture) enhanced the development of transformed colonies; these SV40-transformed cells treated with IUDR also developed into tumors (in hamster cheek pouches) much more rapidly than untreated transformed cells. This enhanced malignancy was found with cells maintained in vitro for 1-3 mo. after SV40 and IUDR treatment. Thymidine (35 µg/culture) abolished the enhancement of transformation induced by IUDR (25 µg/culture).

69-1581 SV40 T ANTIGEN INDUCTION AND TRANSFORMATION IN HUMAN FIBROBLAST CELL STRAINS. (E.) Aaronson, S. A. (NCI, Bethesda, Md.) and G. J. Todaro. Virology 36(2):254-261, 1968.

In human fibroblast cultures (embryonic lung, newborn skin, adult skin) infected with SV40, the frequency of transformation was directly related to the proportion of cells producing SV40 T antigen in the acute infection. In susceptible cells, T antigen was induced in 1 cell/250 PFU; in resistant cells, the efficiency of SV40 T antigen induction was 1 cell/10^5 PFU. However, the probability of T antigen-producing cells giving rise to transformed colonies was 1/250 for both resistant and susceptible cells. Most cultures of newborn or adult origin fell into the normal (intermediate) category of SV40 susceptibility, though some randomly selected fibroblasts from adults were classified as susceptible and resistant. Most of the susceptible cultures were derived from persons with genetic diseases associated with a high cancer risk, such as Fanconi's anemia and members of "sarcoma-prone" or "transformation-prone" families.

69-1582 RADIATION RESPONSES OF EMBRYONAL AND SV40 TRANSFORMED HAMSTER CELLS IN CULTURE. (E.) Kouri, R. E. (U. Tennessee, Knoxville) and J. H. Coggin, Jr. Proc. Soc. Exp. Biol. Med. 129(2):609-620, 1968.

Several parameters of the response to irradiation (250-1250 r) were studied in primary cultures of normal hamster embryonic lung and kidney cells, and in a cell line from the SV40-induced F5-1 hamster tumor. The results suggested the presence of at least 2 populations of surviving cells as potential targets for SV40 transformation: 1 including cells undergoing depressed DNA synthesis, the other composed of cells "trapped" in some stage of the cell cycle (possibly G-2), and unable to initiate DNA synthesis after irradiation. The different responses of cellular DNA synthesis in the embryonic and tumor cells were reflected by the different morphological changes in surviving irradiated cells. Surviving embryonic cells usually showed 1 very large nucleus, without an increase in DNA content/cell. Irradiated tumor cells uniformly developed into polynuclear giant cells, with an increased DNA content/cell. It is suggested that the tumor cell genome contained a particular radiosensitive "target" (influenced in some way by the SV40 genome), controlling nuclear separation, or daughter cell formation, or both; the low percentage (about 15%) of polynuclear giant cells in the irradiated embryonic cell population, suggested that this "target" was either smaller or more radiation-resistant than the corresponding locus in the tumor cells.

69-1583 MORPHOLOGICAL TRANSFORMATION OF HUMAN EMBRYONIC LIVER CELLS BY SIMIAN VIRUS 40. (E.) Van Der Noordaa, J. (U. Amsterdam, Netherlands) and G. Khoury. J. Gen. Virol. 3(Pt. 2):275-278, 1968.

Human embryonic liver cell cultures, infected with SV40, showed both spindle-shaped and epithelial-like cells after 3 days (no change was seen in controls). By 7 wk. (subculture 3), 3/5 inoc. cultures had foci of epithelioid cells. The morphological characteristics of transformation consisted of many mitoses, pleomorphic nuclei with many nucleoli, and loss of contact inhibition; changes showing in vitro transformation were increased acid production, loss of contact inhibition, and increased ability to persist in serial subculture. Immunofluorescence indicated that 70-80% of the nuclei of a population of transformed cells contained viral antigen. It was hypothesized that viral coat protein was synthesized in many cells without subsequent maturation or viral release, and/or that these cells contained component(s) of "T" antigen in a conc. much higher than in hamster tumor cells, capable of reacting with traces of "T" antibodies often found in antiviral sera.

69-1584 ISOLATION OF DEFECTIVE LYSOGENS FROM SIMIAN VIRUS 40-TRANSFORMED MOUSE KIDNEY CULTURES. (E.) Dubbs, D. R. (Baylor U. Coll. Med., Houston, Tex.) and S. Kit. J. Virol. 2(11):1272-1282, 1968.

Rescue of SV40 from a large number of hamster and mouse cell lines transformed by non-irradiated or UV-irradiated SV40 was studied, using a combination of 3 tests (involving cocultivation with susceptible CV-1 monkey kidney cells, with or without exposure to non-irradiated or UV-irradiated Sendai virus). SV40 was rescued in all trials (with the combination of tests) from TSV-5 hamster cells and mKS-BU100 mouse cells. A group of mouse kidney cell lines transformed by UV-irradiated SV40 (mKS-U lines) showed a wide variation in SV40 yield. All mKS-U lines contained the SV40-specific tumor antigen, and some produced SV40 in all trials, but others were classified as "poor" or "rare" virus yielders, and 48 lines never yielded SV40 (even after Sendai virus treatment). These last 3 types were tentatively described as "defective lysogens," with mutational lesions at loci essential for SV40 replication, or detachment of SV40 from integration sites, or both.

69-1585 VIRAL AND HOST DEOXYRIBONUCLEIC ACID SYNTHESIS IN SHOPE FIBROMA VIRUS-INFECTED CELLS AS STUDIED BY MEANS OF HIGH-RESOLUTION AUTORADIOGRAPHY. (E.) Scherrer, R. (Inst. Cancer Res., Villejuif, France). J. Virol. 2(12):1418-1428, 1968.

Viral and cellular DNA synthesis was studied in BSC-1 monkey kidney cells, infected with Shope fibroma virus (SFV) and labeled with 1-hr. pulses of ^{3}H-thymidine at various times after infection. The results demonstrated SFV DNA synthesis in the cytoplasm (no cytoplasmic labeling was seen at any time in non-infected control cells), which began before 3 hr., reached max. levels after 8-9 hr., then declined rapidly; this decline was correlated with the onset of SFV morphogenesis. Nuclear labeling (reflecting host cell DNA metabolism) was slightly reduced 4 hr. after SFV infection, and almost completely suppressed in the late stages of SFV replication; in control cultures, nuclear labeling was weak up to 7 hr., but intense at 12 and 16 hr. (after the entire cell population had entered the S phase of DNA synthesis). The 1-hr. ^{3}H-thymidine pulse was not sufficient to produce labeled SFV progeny.

69-1586 RNA POLYMERASE IN CELLS INFECTED WITH SHOPE FIBROMA VIRUS. (E.) Chang, L. M. S. (Indiana U. Med. Ctr., Indianapolis) and M. E. Hodes. Virology 36(2):323-326, 1968.

Results of a study of nuclear and cytoplasmic RNA polymerase activity in Shope fibroma virus-infected primary rabbit kidney cell cultures, suggested that the viral genome competed with the host cell genome for the synthesis of messenger RNA.

69-1587 DATA OBTAINED IN STUDIES OF A TRANSPLANTABLE STRAIN OF SHOPE RABBIT CARCINOMA. (Rus.) Nadareishvili, A. E. (Inst. Exp. Path. Ther., Sukhumi, USSR), M. M. Tarba and N. G. Kotrikadze. Vop. Virus. 13(4):449-454, 1968.

A transplantable cell line was established over 7 yr. by 125 serial transplantations (i.m.) of the Shope skin carcinoma to non-inbred newborn rabbits. After 9 serial transplantations, the tumor incidence was 100% and the latent period was 8-10 days (compared to 30-40 days in the earlier passages). Passages 7, 22, 23, 27, 30, 31 and 37 of this tumor yielded Shope papilloma virus (SPV); the virus was not recoverable from the later transplant generations. Attempts to induce SPV by X-irradiation (5000-15,000 r) of 3 non-virus-producing tumors were unsuccessful. Neutralization of SPV by extracts of the non-virus-producing tumors, however, indicated the presence of SPV-specific antibodies. SPV could be unmasked in 3/27 non-virus-producing tumors by heating of the tumor extracts (60° C for 1 hr.).

69-1588 MENINGIOMAS AND FIBROBLASTIC NEOPLASIA IN CALVES INDUCED WITH THE BOVINE

PAPILLOMA VIRUS. (E.) Gordon, D. E. (U. Wisconsin, Madison) and C. Olson. Cancer Res. 28(12):2423-2431, 1968.

Dairy breed calves (about 1 wk. old) from herds free from cutaneous fibropapillomatosis were inoc. with bovine papilloma virus (BPV) and necropsied 33-278 days later. Intracranial meningeal fibromas and cutananeous fibropapillomas were induced in 17/19 animals (89.5%) at the site of inoc. with suspensions of partially purified BPV. Intracranial fibromas were evident after as early as 33 days and skin tumors after 16 days; fibromatous tumors were also induced at inoc. sites in the rumen, urinary bladder, tongue, kidney and muzzle (1 each). Moderate stimulation of fibroblasts was noted in the perineurium and epineurium of the peripheral and spinal nerves at the level of the cauda equina, following local BPV exposure. A similar response was noted at inoc. sites in the abomasum and small intestine in some calves. Spindle-shaped fibroblastic cells in interlacing bundles were observed in the tumors. BPV particles were not observed in the tumor cells, nor could infectivity be demonstrated following inoc. of intracranial tumor tissue into the skin of susceptible calves.

69-1589 VIRUSES AND RENAL CARCINOMA OF Rana pipiens. VII. PROPAGATION OF A HERPES-TYPE FROG VIRUS. (E.) Gravell, M. (U. Tennessee Med. Units, Memphis), A. Granoff and R. W. Darlington. Virology 36(3):467-475, 1968.

Frog virus (FV-4) isolated from the urine of frogs bearing Lucké renal adenocarcinoma, showed a fairly slow multiplication rate; equivalent amounts of cell-associated and released virus were found late in the growth cycle. At 25° C, the virus multiplied in Rana pipiens embryo cells, with a CPE and plaque formation. Infectivity was lost if the virus was exposed to pH 3.0 or to ether. The morphology of the virus was indistinguishable from that of the herpes-type virus of Lucké tumor cells, and similar to that of presently known herpes viruses.

69-1590 INFECTIOUS MONONUCLEOSIS: SERIAL HETEROTRANSPLANTATION OF A CELL LINE ISOLATED FROM PERIPHERAL BLOOD. (E.) Adams, R. A. (Harvard Sch. Med., Boston, Mass.), G. E. Foley, L. Pothier, H. Lazarus and A. Stuart. Proc. Amer. Ass. Cancer Res. 10:2, 1969.

69-1591 INDUCTION OF INFECTIOUS MONONUCLEOSIS IN MAN BY THE HERPES-TYPE VIRUS (HTV) IN BURKITT LYMPHOMA CELLS IN TISSUE CULTURE. (E.) Grace, J. T., Jr. (Roswell Park Mem. Inst., Buffalo, N. Y.), J. Blakeslee, Jr. and R. Jones, Jr. Proc. Amer. Ass. Cancer Res. 10:31, 1969.

69-1592 STUDIES ON THE NATURE OF SURFACE IMMUNOFLUORESCENCE IN EBV INFECTED CELLS. (E.) Dunkel, V. C. (Roswell Park Mem. Inst., Buffalo, N. Y.), J. S. Horoszewicz and J. T. Grace, Jr. Proc. Amer. Ass. Cancer Res. 10:20, 1969.

69-1593 PRESENCE OF HERPES-TYPE VIRIONS IN CHINESE NASOPHARYNGEAL TUMOR CULTURED IN VITRO. (E.) De-Thé, G. (Int. Ctr. Cancer Res., Lyon, France), J. C. Ambrosioni, H. C. Ho and H. C. Kwan. Proc. Amer. Ass. Cancer Res. 10:19, 1969.

69-1594 FURTHER CHARACTERIZATION OF HUMAN HEMATOPOIETIC CELL LINES. (E.) Imamura, T. (Roswell Park Mem. Inst., Buffalo, N. Y.), C. C. Huang and B. A. Maurer. Proc. Amer. Ass. Cancer Res. 10:42, 1969.

69-1595 VIRUS PARTICLES IN GUINEA PIG LEUKEMIA AND IN CAT MAMMARY CARCINOMA. (E.) Gross, L. (VA Hosp., Bronx, N. Y.) and D. G. Feldman. Proc. Amer. Ass. Cancer Res. 10:33, 1969.

69-1596 CONCOMITANT LOSS OF VIRIONS AND ANTIGENICITY IN TRANSPLANTED THYMIC LYMPHOMA OF W/Fu RATS INDUCED BY RADIATION LEUKEMIA VIRUS. (E.) Carnes, W. H. (U. California, Los Angeles), B. G. Bowman and M. L. Hart. Proc. Amer. Ass. Cancer Res. 10:13, 1969.

69-1597 RELATIONSHIPS BETWEEN TUMOR SPECIFIC ANTIGENS AND VIRUS PARTICLES IN RAT LYMPHOMAS INDUCED BY RADIATION LEUKEMIA VIRUS. (E.) Ferrer, J. F. (Stanford U. Sch. Med., Calif.) and F. Gibbs. Proc. Amer. Ass. Cancer Res. 10:24, 1969.

69-1598 STUDIES ON THE ERYTHROPOIETIC ACTIVITY OF MURINE VIRUS-INDUCED LEUKEMIC CELLS CLONED IN VITRO. (E.) Friend, C. (Mt. Sinai Sch. Med., New York, N. Y.), W. Scher and G. B. Rossi. Proc. Amer. Ass. Cancer Res. 10:27, 1969.

69-1599 BIOPHYSICAL STUDIES OF NUCLEI FROM NORMAL AND FRIEND LEUKEMIA VIRUS (FLV) INFECTED MOUSE SPLEEN. (E.) Fiel, R. J. (Roswell Park Mem. Inst., Buffalo, N. Y.) and J. L. Ambrus. Proc. Amer. Ass. Cancer Res. 10:24, 1969.

69-1600 PROTECTION BY ANOTHER MURINE LEUKEMIA VIRUS AGAINST INDUCTION OF FRIEND VIRUS DISEASE. (E.) Buffett, R. F. (Roswell Park Mem. Inst., Buffalo, N. Y.), E. A. Mirand and J. T. Grace, Jr. Proc. Amer. Ass. Cancer Res. 10:11, 1969.

69-1601 REMISSION OF FRIEND LEUKEMIA IN BDF_1 HYBRID MICE. (E.) Dawson, P. J. (U. Oregon Sch. Med., Portland) and A. H. Fieldsteel. Proc. Amer. Assoc. Cancer Res. 10:17, 1969.

69-1602 EFFECT OF FRIEND AND RAUSCHER LEUKEMIA VIRUS UPON δ-AMINOLEVULINIC ACID SYNTHETASE ACTIVITY IN MURINE SPLEEN AND LIVER. (E.) Ebert, P. S. (NCI, Bethesda, Md.) and P. A. Ellsworth. Proc. Amer. Ass. Cancer Res. 10:21, 1969.

69-1603 ELECTRON MICROSCOPY OF RNA MOLECULE OF RAUSCHER LEUKEMIA VIRUS. (E.) Kakefuda, T. (NCI, NIH, Bethesda, Md.) and J. P. Bader. Proc. Amer. Ass. Cancer Res. 10:44, 1969.

69-1604 EFFECT OF L-ASPARAGINASE ON RAUSCHER VIRUS-INDUCED MURINE LEUKEMIA. (E.) Campbell, W. F. (Indiana U., Indianapolis) and A. S. Levine. Proc. Amer. Ass. Cancer Res. 10:12, 1969.

69-1605 REGENERATION AND LYMPHOMAGENESIS IN THYMUS RETICULAR CELL GRAFTS IN THE PRESENCE OF GROSS VIRUS. (E.) Hays, E. F. (U. California Sch. Med., Los Angeles). Proc. Amer. Ass. Cancer Res. 10:37, 1969.

69-1606 COMPARISON BY BIOASSAY TITRATION OF GROSS LEUKEMIA VIRUS (GLV) FROM ANIMAL AND TISSUE CULTURE SOURCES. (E.) Ioachim, H. L. (Columbia U. Coll. Phys. Surg., New York, N. Y.). Proc. Amer. Ass. Cancer Res. 10:42, 1969.

69-1607 A NEW TUMOR INDUCING VARIANT OF MOLONEY LEUKEMIA VIRUS. (E.) Abelson, H. T. (NCI, Bethesda, Md.) and L. S. Rabstein. Proc. Amer. Ass. Cancer Res. 10:1, 1969.

69-1608 DECREASED RATE OF SYNTHESIS OF IMMUNOGLOBULIN (IgG) IN RATS INFECTED WITH MOLONEY VIRUS. (E.) Cure, S. F. (California State Dept. Pub. Health, Berkeley) and N. E. Cremer. Proc. Amer. Ass. Cancer Res. 10:16, 1969.

69-1609 ISOLATION AND IDENTIFICATION OF A HELPER VIRUS FOUND IN THE MOLONEY SARCOMA-LEUKEMIA VIRUS COMPLEX. (E.) Fischinger, P. J. (NCI, Bethesda, Md.). Proc. Amer. Ass. Cancer Res. 10:25, 1969.

69-1610 EFFECT OF CYTOSINE ARABINOSIDE ON THE REPLICATION OF THE MOLONEY SARCOMA VIRUS IN 3T3 CELL CULTURES. (E.) Hirschman, S. Z. (NCI, Bethesda, Md.). Proc. Amer. Ass. Cancer Res. 10:38, 1969.

69-1611 TREATMENT OF PRIMARY MOLONEY SARCOMA VIRUS (MSV)-INDUCED TUMORS IN BALB/c MICE. (E.) Fefer, A. (U. Washington Sch. Med., Seattle) and M. Gaston. Proc. Amer. Ass. Cancer Res. 10:23, 1969.

69-1612 REPLICATION OF MOUSE SARCOMA VIRUS MOLONEY STRAIN (MSV-M) IN HUMAN CELLS. (E.) Boiron, M. (St. Louis Hosp., Paris), C. Bernard and J. C. Chuat. Proc. Amer. Ass. Cancer Res. 10:8, 1969.

69-1613 EXPERIMENTAL STUDIES WITH CELL-FREE EXTRACTS FROM HUMAN OVARIAN TUMORS. (E.) Hartmann, P. Proc. Amer. Ass. Cancer Res. 10:36, 1969.

69-1614 THE INCIDENCE OF MAMMARY TUMORS IN X/Gf MICE FOSTER-NURSED BY IBA/Gf FEMALES. (E.) Goldfeder, A. (New York U., N. Y.) and A. K. Ghosh. Proc. Amer. Ass. Cancer Res. 10:31, 1969.

69-1615 CORRELATION OF INFECTIVITY WITH RADIOISOTOPE STUDIES OF THE MAMMARY TUMOR VIRUS (MTV) IN VITRO. (E.) Cardiff, R. D. (U. California, Berkeley) and P. B. Blair. Proc. Amer. Ass. Cancer Res. 10:13, 1969.

69-1616 HYPERPLASTIC ALVEOLAR NODULES IN HIGH (+) AND LOW (-) MAMMARY CANCER SUBLINES OF C3H/Ki MICE. (E.) Bagby, S. P. (Baylor U. Sch. Med., Houston, Tex.), A. G. Liebelt, R. A. Liebelt and K. DeOme. Proc. Amer. Ass. Cancer Res. 10:4, 1969.

69-1617 INFLUENCE OF HORMONES AND MTV ON DNA SYNTHESIS IN NODULE OUTGROWTHS (HAN) OF MOUSE MAMMARY GLAND. (E.) Barnawell, E. B. (U. Nebraska, Lincoln) and M. R. Banerjee. Proc. Amer. Ass. Cancer Res. 10:4, 1969.

69-1618 INHIBITION OF POLYOMA REPLICATION IN VITRO BY 6-METHYLMERCAPTOPURINE RIBOSIDE. (E.) Bowen, J. M. (U. Texas M.D. Anderson Hosp., Houston), R. G. Hughes and L. Dmochowski. Proc. Amer. Ass. Cancer Res. 10:9, 1969.

69-1619 SV40 TRANSPLANTATION ANTIGEN (TrAG) DURING PRIMARY INFECTION OF AFRICAN GREEN MONKEY KIDNEY CELLS. (E.) Girardi, A. J. (Wistar Inst., Philadelphia, Pa.) and V. Defendi. Proc. Amer. Ass. Cancer Res. 10:29, 1968.

See also abstract nos.: 1350,1353,1354,1355,1357,1358,1363,1364,1452,1499,1637,1646

69-1620 ASSOCIATION OF DIABETES AND CANCER IN THE STATISTICS OF THE TUMOR CENTER OF TRIESTE. (It.) Marinuzzi, A. (Trieste Ctr. Diag. Cure Tumors, Italy). Minerva Med. Giuliana 8(4):250-251, 1968.

In 1966, 1203 cases of cancer were reported to the Trieste Tumor Center. Diabetes mellitus (DM) was found in 20/620 men (3.2%) and 21/583 women (3.6%) with cancer. In the DM group, 5/20 men (25%) had bronchopulmonary cancer, accounting for 2.5% of the 198 such cases reported. Of the women with DM, 12/21 (57%) had cancer of the breast (5), cervix uteri (1), ovary (2) or endometrium (4), accounting for 4.6% of 262 cases of breast and female genital tumors reported; the 4 pts. with endometrial cancer were 13.8% of the 29 reported cases.

69-1621 CLINICAL-STATISTICAL DATA ON THE ASSOCIATION OF DIABETES MELLITUS AND MALIGNANT TUMORS. (It.) Magris, D. (Maj. Hosp., Trieste, Italy) and M. Udovich. Minerva Med. Giuliana 8(4):245-249, 1968.

Of 47,983 pts. seen at this hospital in 1957-1966, 2140 (4.5%) had diabetes mellitus (DM), 1847 (3.8%) had cancer, and 117 (0.24%) had both DM and cancer. The cancer incidence in the DM pts. was 5.4% (5.1% in males, 5.6% in females); all pts. with DM and cancer were adults (30 and over). The cancer frequency in the DM group was higher in pts. with mild or very mild DM (6.8%) than in pts. with moderate or severe DM (1.7% and 2.9%, resp.); similarly, the cancer frequency was relatively high in pts. with DM of less than 5 yr. duration (as compared to pts. with DM of longer duration) and in pts. receiving no antidiabetic therapy (as compared to pts. admin. p.o. antidiabetic agents or insulin). The over-all DM incidence in the pts. with cancer was 6.3% (117/1847); it was highest in pts. with cancer of the skin (7/35 = 20%) or uterus and ovary (29/232 = 12.5%) and very low in pts. with leukemia (3/124 = 2.4%). The DM incidence was 7.9-9.3% in pts. with cancer of the colon + rectum, kidney + bladder or liver, and sarcoma, about 3-6% in pts. with cancer of the esophagus, stomach, lung and breast, and 2.4% in prostate cancer (2/82). DM was noted in 2/8 with tongue cancer, and 0/36 with tumors of the larynx (32), brain (3) or bone (1).

69-1622 PREMALIGNANT DISEASES OF THE UTERINE CERVIX IN KAZAKHSTAN (RESULTS OF A SURVEY). (Rus.) Nugmanov, S. N. (Res. Inst. Oncol. Radiol., Alma-Ata, USSR) and O. L. Smakhtina. Vop. Onkol. 14(12):81-85, 1968.

The frequencies of gynecological diseases were studied in 8899 women (4936 of "Western" and 3963 of "Eastern" nationalities) from 4 regions of Kazakhstan. Gynecological diseases were found in 2672 women (30.1% of the group). Premalignant lesions of the uterine cervix were noted in 12.5% of the group (1121/8899); they were more frequent in women of Russian, Ukrainian or other "Western" nationalities (680/4936 = 13.8%) than in women of Kazakh, Uzbek or other "Eastern" nationalities (441/3963 = 11.1%). In both groups, premalignant lesions of the cervix were most frequent in women under 50 (16.6% and 14.2%, resp., in women up to 29 yr. old). The incidence of these lesions was lower in women who had shown delayed puberty. The number of pregnancies and deliveries did not affect the incidence of premalignant lesions of the cervix, but the incidence was increased in women with histories of abortions.

69-1623 TABULATION AND STATISTICAL EVALUATION OF CERVICO-UTERINE CANCER DETECTION IN WOMEN'S HOSPITAL. (Sp.) García, G. (Women's Hosp., Mexico City) and A. Díaz de León. Ginec. Obstet. Mex. 24(144):417-421, 1968.

The authors describe the current method of uterine cancer detection in use in Women's Hospital and present results in 7112 pts. examined from May 1, 1966 to December 31, 1967. No clinical or anatomical lesions were evident in 4598 pts. (63.9%; mean age 29.47 yr.); histological findings were classified as I (no pathology) in 2179, but the others had lesions classified as II (inflammatory) in 2313, III (dysplasia) in 89, IV (intraepithelial carcinoma) in 7, and V (invasive carcinoma) in 10. In 2227 pts. (31%; mean age 35.25 yr.) with clinical and anatomical signs of benign lesions without suspicion of malignancy, the lesions were classified histologically as I in 596, II in 1557, III in 77, IV in 12 and V in 6 pts. In 287 pts. (3.9%; mean age 43 yr.) the clinical diagnosis was suspected malignancy; of these, 29 were classified histologically as I, 162 as II, 27 as III, 23 as IV, and 46 as V. (See also the following abstract)

69-1624 COMMENTS ON "TABULATION AND STATISTICAL EVALUATION OF CERVICO-UTERINE CANCER DETECTION IN WOMEN'S HOSPITAL." (Sp.) Carranza García, J. V. (Oncol. Hosp., Mexico City). Ginec. Obstet. Mex. 24(144):423-426, 1968.

In commenting on the preceding paper, the author stresses the diagnostic importance of biopsy and conization in pts. with abnormal cervical smears. Cervical smear diagnoses of carcinoma in situ and microinvasive carcinoma were subsequently described as false positive in 6% and 5% of pts., resp. (most of these pts. showed cervical erosion, alone or associated with other signs; leukoplakia was rare), and false negative in 7% and 2%, resp. Cytological specimens and biopsies combined failed to reveal cancer in 1.8%, but the correct diagnosis was established by conization in 178/178 pts. In the author's series of 460,000 smears observed over about 5.5 yr. (since November, 1962), the incidence of cervico-uterine cancer (all stages) in pts. examined for the first time was 1%; in pts. returning for second or third examinations, this incidence fell to 0.3%.

69-1625 CHORIOCARCINOMA IN PUERTO RICO. A 15-YEAR STUDY. (E.) Aranda, J. M. (Dept. Health, Santurce, P.R.) and I. Martinez. Bol. Asoc. Med. P. Rico 60(11):523-535, 1968.

From 1950-1965 (inclusive), 44 cases of choriocarcinoma were seen in Puerto Rico. Excluding 1 man with choriocarcinoma arising from a testicular teratoma, 1 woman with choriocarcinoma arising from an ovarian teratoma, and 2 women with uncertain histological diagnosis, there were 40 histologically verified cases definitely traced to the preceding pregnancy (molar in 45%, abortion in 25%, full term pregnancy in 15%), for an incidence of 1/32,460 deliveries (compared to about 1/70,000 in the U.S. and 1/250 to 1/3708 in Asia). The incidence of choriocarcinoma (as a proportion of the number of births), tabulated by maternal age, in Puerto Rico and the U.S. (previously reported), was: 1/30,655 and 1/80,858, resp., at age 19 yr.; 1/42,526 and 1/138,065, resp., at age 20-29 yr.; 1/48,132 and 1/91,704, resp., at age 30-39 yr.; and 1/3786 and 1/44,332, resp., at age 40 and over. The disproportionately high incidence of choriocarcinoma in Puerto Rican women in the 40+ age group led to the recommendation of special prenatal care and postpartum follow-up in women of this age group, especially those who have had abortions or molar pregnancies.

69-1626 BRAIN TUMOR MORBIDITY AND MORTALITY IN ISRAEL. (Heb.) Cohen, A. (Tel Hashomer Gov. Hosp., Israel) and B. Modan. Harefuah 75(11):477-480, 499, 1968.

In 1950-1964, brain tumors (1108 cases; 607 males, 501 females) accounted for 0.72% of all deaths in Israeli Jews. The mean annual mortality rate/100,000 population was 4.3 (an increase in mortality rates after 1950 may reflect the effects of improved diagnostic procedures). The mortality rate increased sharply after age 30, reaching 14.2/100,000 at age 60-69. From 1960-1964, 859 new cases of brain tumors were found in Israeli Jews; the av. annual morbidity rate/100,000 population for the 741 evaluated cases was 7.3 (7.4 in males, 7.2 in females; 4.4 for malignant tumors, 2.4 for benign tumors). The most frequent malignant tumors (376 cases) were glioblastoma multiforme (39.9%) and astrocytoma (24.7%); in children (age 0-15), the most frequent tumors were astrocytoma (28%), medulloblastoma (23%) and ependymoma (19.7%). All benign brain tumors (244 cases) were seen in pts. over 15; the most frequent tumors were meningioma (72%) and acoustic neurinoma (25.2%) Malignant tumors were more frequent among males (ratio of 1.4:1) and benign tumors in females (ratio of 1.6:1). These morbidity and mortality data were obtained from 2 different sources, but the rates were very similar. Brain tumor morbidity and mortality rates were significantly higher in Israeli Jews of European birth than in persons born in Africa or Asia. When the group of pts. with spinal neoplasms was added to the group with brain tumors, the total CNS tumor morbidity rate rose to more than 9/100,000 population, the highest in the world. By comparison, CNS tumor morbidity rates in males and females were 8.9 and 8.7, resp., in Sweden, and 8.3 and 7.3, resp., in Norway. The significance of these high brain tumor morbidity and mortality rates in Israeli Jews was unknown.

69-1627 EPIDEMIOLOGY OF BASAL CELL CARCINOMA IN THE NORTH OF ISRAEL. (Heb.) Mahler, D. (Rambam Gov. Hosp., Haifa, Israel) and B. Hirshowitz. Harefuah 75(11):474-477, 499, 1968.

The epidemiology of skin cancer was studied in 10,000 adults (over 20) living in northern Israel (1/42 of the total population of this area). Preliminary data on 4880 Jewish residents are given. Basal cell carcinoma (BCC) was found in 62/4880 (1.3% of the Jewish population over 20; 0.65% of the Jewish population at all ages); 29 pts. (0.6% of the 4880 subjects) showed BCC at the time of examination, and 33 pts. (0.7% of the 4880 subjects) reported histories of previous treatment for skin cancer; however, the histories of treatment for skin cancer could not be verified in 20/33. The incidence of squamous cell carcinoma and melanoma in the entire Jewish population (all ages) was 0.02% each (no other details). In the pts. with BCC, the male:female ratio was 8:5; all pts. were at least 30 yr. old, with a peak in the 50-59 yr. age group (53/4880 subjects were over 70; this group was too small to obtain accurate data on the BCC incidence at this age. Multiple tumors were present in 14.5% of the BCC group; 90% of these 79 tumors involved the face, neck and/or hands. The survey questionnaire included questions concerning the subjects' reactions to sunlight, but the relationships between sun exposure and BCC in this pt. group are not discussed. The incidence of BCC was about the same in rural residents (17/881 = 1.9%; 2.2% in men, 1.6% in women) and in urban residents (45/3999 = 1.1%; 1.3% in men, 0.7% in women).

69-1628 MULTIPLE PRIMARY SKIN CANCER. (Pol.) Wojcieszek, Z. (Oncol. Inst., Gliwice, Poland). Nowotwory 18(4):377-382, 1968.

At the Oncological Institute in Gliwice, 440 pts. (221 men, 219 women) with a total of 1172 multiple primary skin tumors were observed between 1947-1961 (10.9% of all pts. with skin cancers seen during that time). Basocellular carcinoma was the most frequent tumor (280/440 = 63.6%); squamous cell carcinoma was seen in 75 pts. (17%) and mixed basal cell and squamous cell carcinoma in 85 pts. (19.4%). In the majority of pts., new tumors were noted a few wk.-10 yr. after first treatment (metachromatic appearance); in 389 pts. (88.5%), the tumors were located on the exposed parts of the body. There was no relationship between sex and incidence, but a correlation with age was seen. The incidence of multiple primary skin carcinomas (expressed as a percentage of all pts. with skin carcinoma) increased from 5.7% at age 20-40 yr. to 15.4% at age 80 yr. A clinically advanced form of the disease was first seen only in pts. with simultaneously appearing tumors (19.4%).

69-1629 OSTEOSARCOMA. (E.) Poppe, E. (Norwegian Radium Hosp., Oslo), K. Liverud and J. Efskind. Acta Chir. Scand. 134(7):549-556, 1968.

In the 27-yr. period 1938-1964, 127 pts. with osteosarcoma were referred to this hospital (in recent times, about 7 cases/yr., or over 50% of all cases registered in Norway). The annual incidence of osteosarcoma in Norway was 1/300,000 inhabitants/yr. (12 new cases/yr.). The tumors involved the metaphyses in the knee joint region in 75/127 pts. The majority of pts. were under 20 yr. old (nearly 80/127 were in the 10-20 yr. age group).

69-1630 LYMPHOSARCOMA OF THE STOMACH. A CLINICAL STUDY OF 39 CASES. (E.) Salmela, H. (U. Helsinki, Finland). Acta Chir. Scand. 134(7):567-576, 1968.

The 1953-1960 records of the Finnish Cancer Registry disclosed a total of 4968 new, histologically verified primary malignant tumors of the stomach. Sarcomas accounted for 1.1% of this total; 39 tumors (0.9%) were identified as primary lymphosarcomas (including reticulum cell sarcomas and Hodgkin's disease) and all of the other sarcomas (number not stated) were leiomyosarcomas, with an av. diagnosis rate of about 5-6 and 2-3 new cases/yr. All pts. with lymphosarcoma of the stomach were adults (mean age 54.1 yr.), with a male:female ratio of 2:1 (26 men, 13 women). Clinical and pathological findings suggested that 4/39 lymphosarcomas had developed from gastric ulcers.

69-1631 PATHOGENESIS AND CLINICAL STUDIES OF PULMONARY CANCER IN FEMALE PATIENTS. (Rus.) Grigorian, A. V. (1st Med. Inst., Moscow), S. V. Lokhvitskii and E. L. Lerner. Vop. Onkol. 14(9):19-23, 1968.

Autopsy records (from 1946-1957) of 1 Moscow hospital showed lung cancer in 401/9757 autopsies (4.1%), with a male:female ratio of 3.26:1. The 1954-1965 records from 1 general surgical clinic (Moscow) showed 724 cases of lung cancer, with a male:female ratio of 6.54:1; in 38 pts. with benign lung tumors, the male:female ratio was 1.25:1. A group of 46 female pts. with lung cancer included 18 women whose tumors were identified 4-12 mo. after the menopause. Predisposing conditions in these women included inflammatory lung and other respiratory diseases (34/46), pulmonary tuberculosis (4/46), chronic infections (6/46), recurrent acute tracheobronchitis (12/46) and smoking (21/46). Epidermoid carcinoma was present in 17/21 of the smokers, but adenocarcinomas (seen in 23.9% of the group) were more frequent in non-smokers. The incidence of peripheral forms of lung cancer was higher in this group of women (30.3%) than the reported incidence of such forms in groups of male pts.

69-1632 DISTRIBUTION OF ACUTE LEUKAEMIA IN TIME AND SPACE. STUDIES IN NEW ZEALAND. (E.) Gunz, F. W. (Sydney Hosp., Australia) and G. F. S. Spears. Brit. Med. J. 4(5631): 604-608, 1968.

Temporospatial distribution of leukemia was studied in 288 children (0-14 yr.) with leukemia (acute in 280, chronic granulocytic in 8) and 715 adults (382 men, 333 women) with acute leukemia, who died in New Zealand from 1953-1964 (inclusive). The male:female ratio was 1.8:1. The modal age was 2.5 yr. in the children and 67.5 yr. in the adults (77.5 in men, 67.5 in women). The mo. of onset was determined in 1001/1003 pts. No statistically significant seasonal variation in onset was noted in the children, but the adults showed a highly significant variation, with a peak in the summer (December) and a low in the winter (June-August). No statistically valid evidence of time-space clustering was noted in the group as a whole, in the adults, or in children over 6, but 4 time-space pairs were seen in children under 6 (1/8 children was 4 yr. old, 7/8 were 1-3 yr. old). The observed/expected ratios in the children under 6 for the cells under 2 mo.--under 1 mile and under 3 mo.--under 1 mile were 7.4/1 and 4.3/1, resp. (total, 4 pairs observed/ 0.54 expected). This significant tendency towards time-space clustering in children under 6 suggested the possibility that leukemia may have a different etiology in this age group than that occurring in older pts.

69-1633 QUANTITATIVE STUDIES ON CANCER DISSEMINATION. (E.) Donelli, M. G. (Mario Negri Inst. Pharmacol. Res., Milan, Italy), R. Rosso and S. Garattini. Cancer Res. 29(2):414-418, 1969.

A method for the quantitative estimation of cancer cells present in the blood and tissues of tumor-bearing animals is described, using ascites Ehrlich carcinoma and Sarcoma 180 (mice) as models.

69-1634 EPIDEMIOLOGY OF UTERINE CANCER. (Jap.) Kasamatsu, T. (Nat. Cancer Inst. Japan, Tokyo), T. Nakanishi and T. Somoda. Nippon Rinsho (Jap. J. Clin. Med.) 26(8):1858-1862, 1968.

Records of 1 hospital disclosed 194 women with cervix cancer in 1967, and 55 pts. with uterine cancer in 1962-1968 (the total number of admissions is not stated). The incidence of uterine cancer was highest in the older age groups. All pts. with cervix cancer were married, whereas 7% with uterine cancer were unmarried; 9.5% and 24.0%, resp., were childless. Urinary sugar tests were positive in 5.7% with uterine cancer and 0.5% with cervix cancer; high blood pressure was noted in 41.8% and 22.6%, resp. Histories of estrogen or progestational hormone treatment were reported by 21.8% with uterine cancer and 6.7% with cervix cancer. It is suggested that the sexual history is of importance in pts. with cervix cancer, whereas abnormalities of internal secretion are of greater importance in the etiology of uterine cancer.

69-1635 EPIDEMIOLOGY OF CANCER OF THE ESOPHAGUS. (Jap.) Takano, K. (Women's Med. Coll., Tokyo), K. Osogoshi, N. Kamimura, K. Kanda, K. Kane, R. Kamiyama, K. Sakamoto, H. Sato, Y. Shirai, M. Sei, T. Tanabe, M. Horino, Y. Minami, H. Motoji, R. Morita, H. Orihata and T. Hirayama. Nippon Rinsho (Jap. J. Clin. Med.) 26(8):1823-1828, 1968.

The relative risks of esophagus cancer were studied in a small group of cancer pts. (167 men, 33 women) and the same number of normal subjects. The relative risk was higher in rural residents than in urban residents; this was attributed to poor nutrition (diets consisting mostly of soy soup, rice and noodles) in the rural areas; persons reporting a high consumption of bread, fruit and milk showed a low relative risk. Other factors associated with a high relative risk of esophagus cancer were the consumption of hot foods, daily consumption of liquor (especially sake) and heavy smoking (more than 20 cigarettes/day), particularly in persons reporting all 3 habits combined. The relative risk associated with smoking alone was increased only slightly.

69-1636 EPIDEMIOLOGY OF PANCREATIC CANCER. (Jap.) Ishii, K. (Natl. Cancer Inst. Japan, Tokyo), K. Nakamura, H. Ozaki, N. Yamada and T. Takeuchi. Nippon Rinsho (Jap. J. Clin. Med.) 26(8):1839-1842, 1968.

Dietary habits and preferences were examined in 475 pts. with cancer of the pancreas. Smoking and alcohol consumption were associated with an elevated relative risk, as well as high consumption of meats and low consumption of vegetables. No definite conclusions could be drawn from this study, but further studies of a larger group of pts. are recommended.

69-1637 INCIDENCE OF CANCER IN WORKERS ON FARMS WITH ENZOOTIC LEUKEMIA. (Pol.) Aleksandrowicz, J. (Acad. Med., Cracow, Poland) and A. Wolska. Pol. Tyg. Lek. 23(39):1468-1470, 1968.

The cancer incidence was studied in workers and their relatives from 9 farms with histories of enzootic bovine leukosis (BL) in the Cracow area. Of the persons studied, 270/574 had been exposed to BL for 10 yr. or more, including 23/23 pts. with cancer (19 workers and 4 relatives of workers). In 22 pts. described further, the duration of BL exposure was 10-20 yr. in 11/22 (10-15 yr. in 9/11), 21-40 yr. in 6/22 and 41-50 yr. in 5/22. The age range was 34-73 yr.; only 8/22 were 60 or over, while 10/22 were under 50. The most prevalent tumors were cancer of the stomach (5), liver or gallbladder (at least 3) and uterus or cervix (3), with 1 case each of Hodgkin's disease, lymphosarcoma and chronic granulocytic leukemia. No cancer was found among 153 workers (53/153 exposed for 10 yr. or more) on 3/9 BL-enzootic farms. One case each was seen on 3 farms (128 workers; 46 had been exposed for 10 yr. or more). One farm, with 67 workers (39/67 exposed for 10 yr. or more), showed 3 cases of cancer in 2 workers and 1 relative of a worker (2/3 tumors were identified in the same 5-mo. period in 1962). One farm, with 117 workers (39/117 exposed for 10 yr. or more), showed 5 cases of cancer in 3 workers and 2 relatives of workers (2/5 were identified in a 5-mo. period in 1962, and 3/5 in a 9-mo. period in 1965). One farm, with 259 workers (93/259 exposed for 10 yr. or more), showed 12 cases of cancer in 11 workers and 1 relative of a worker (2 cases each were seen in 1959, 1962 and 1964, and 3 cases in 1966). The over-all cancer incidence in this area is 158/100,000 population. Because of the high cancer incidence in these persons exposed to enzootic BL (and the relatively low ages of the cancer pts.), further studies of the possible relationship(s) between BL and human cancer are recommended.

69-1638 COMPARATIVE STUDY OF CARCINOMA OF THE ESOPHAGUS. (E.) Burdette, W. J. (U. Texas M. D. Anderson Hosp., Houston). Proc. Amer. Ass. Cancer Res. 10:11, 1969.

69-1639 CHILDHOOD LEUKEMIA CLUSTERING? (E.) Glass, A. G. (NCI, Bethesda, Md.) and N. Mantel. Proc. Amer. Ass. Cancer Res. 10:29, 1969.

See also abstract nos.: 1366,1367,1368

69-1640 FAMILIAL CENTRAL NERVOUS SYSTEM NEOPLASIA. CASE REPORT OF A FAMILY WITH VON RECKLINGHAUSEN'S NEUROFIBROMATOSIS. (E.) Lee, D. K. (U. California Sch. Med., Los Angeles) and M. L. Abbott. Arch. Neurol. (Chicago) 20(2):154-160, 1969.

A family (4 generations) with a high incidence of CNS tumors (8/17 persons), congenital ocular abnormalities (5/8 with CNS tumors and 2 others) and nonmalignant CNS diseases (2/17 without CNS tumors) is described. The 8 pts. with CNS tumors included 3 pts. with bilateral acoustic neurinomas and multiple meningiomas, and 1 child with a pleomorphic cell sarcoma of the brain stem. Only 1/17 showed all of the clinical signs of von Recklinghausen's disease; 3 pts. showed peripheral neurofibromas, but none had more than 2 cafe-au-lait spots. The combination of posterior polar cataracts and CNS tumors has not been reported previously. Five members of this family were normal.

69-1641 FAMILIAL HAMMAN-RICH SYNDROME. REPORT OF EIGHT CASES. (E.) Swaye, P. (Cleveland Clin. Found., Ohio), H. S. Van Ordstrand, L. J. McCormack and S. E. Wolpaw. Dis. Chest 55(1):7-12, 1969.

The autosomal dominant inheritance of the Hamman-Rich syndrome (acute diffuse interstitial pulmonary fibrosis) is demonstrated by 1 family with 8/22 affected members in 3/4 generations: 2 brothers and 1 sister, and 5 of their female descendants (including 3 daughters and 1 granddaughter of the affected sister; 3/4 were 3.5 mo.-3.5 yr. old at diagnosis). The 2 brothers also had bronchogenic carcinoma, but the association between cancer and pulmonary fibrosis in these pts. could not be determined; both men had been moderate smokers for some time prior to the onset of symptoms (at age 38-40 yr.).

69-1642 MEDULLOBLASTOMA IN NEWBORN SISTERS. REPORT OF TWO CASES. (E.) Belamaric, J. (Wayne State U. Sch. Med., Detroit, Mich.) and A. S. Chau. J. Neurosurg. 30(1):76-79, 1969.

Three consecutively born female infants of a Hong Kong Chinese family died with hydrocephalus in infancy (the 4 oldest children of this family, all boys, were normal). In the first female infant (who died at age 4 mo.) the etiology of the hydrocephalus was unknown; the other 2 infants (who died at age 68 and 12 days, resp.) showed cerebellar medulloblastoma complicated by purulent meningitis at autopsy.

69-1643 HEPATIC HEMANGIOENDOTHELIOMA IN A RHESUS MONKEY. (E.) Woodruff, J. M. (USAF Sch. Aerospace Med., Brooks AFB, Tex.) and D. K. Johnson. Path. Vet. (Basel) 5(4):327-332, 1968.

A male rhesus monkey, treated with proton irradiation (800 rads) in the prepubertal period, developed congestive heart failure 2 yr. later and was sacrificed, showing hemangioendothelioma of the liver but not the skin (this is the first such case in a monkey). No signs of malignancy were noted. Comparison with the tissue changes seen in 4 other monkeys admin. similar doses of proton irradiation (20 mo. before examination) suggested that this hepatic hemangioendothelioma was not radiation-induced.

69-1644 CARCINOMA ARISING IN TUBERCULOUS FALLOPIAN TUBE. (E.) Hameed, K. (Dalhousie U., Halifax, Canada). Amer. J. Obstet. Gynec. 103(4):595-596, 1969.

The records of the Nova Scotia Department of Public Health showed 5 cases of primary carcinoma of the Fallopian tube during the last 15 yr. Two of these pts. also showed tuberculous salpingitis with infertility (1/2 had been treated for pulmonary tuberculosis 14 yr. previously; 1/2 had shown pleurisy with a pleural effusion of undetermined type, 23 yr. previously). Both tumors were identified as papillary alveolar carcinomas. It is suggested that the high incidence of infertility and "nonspecific" chronic inflammation in pts. with tubal carcinoma may indicate an association of tuberculous salpingitis and tubal carcinoma.

69-1645 CYTOGENETIC ABNORMALITIES IN A PLASMACYTOMA. (E.) Mancinelli, S. (Med. Coll. Alabama, Birmingham), J. R. Durant and W. J. Hammack. Blood 33(2, Pt. 1):225-233, 1969.

Aneuploid karyotypes (predomiantly hypodiploid) were noted after phytohemagglutinin and demecolcine treatment in 48/49 tumor cells and 27/54 peripheral blood cells, obtained from a pt. with multiple myeloma and a solid plasmacytoma. Marker chromosomes were present in 72% of the tumor cells; 98% of these marker-positive cells showed acrocentric markers, and about 50% of the cells with acrocentric markers also showed "MG-like" markers. Acrocentric and "MG-like" markers were seen in 5/27 and 7/27 aneuploid peripheral blood cells, resp. In both cases, the acrocentric and "MG-like" markers were always associated with deletions of at least 1 chromosome of Groups D and A, resp. (although some cells showed deletions of these types without markers); if both marker types were seen, both types of deletions were also present. These chromosomal abnormalities were not seen in bone marrow cells (only 2/26 cells were aneuploid). No relationship was established between these chromosomal abnormalities and either the abnormal protein produced, or the history of treatment (radiotherapy, an alkylating agent, prednisone and a testosterone preparation in this pt.).

69-1646 DISSEMINATED VISCERAL KAPOSI'S SARCOMA. APPEARANCE AFTER HUMAN RENAL HOMOGRAFT OPERATION. (E.) Siegel, J. H. (1300 Morris Park Ave., Bronx, N. Y.), R. Janis, J. C. Alper, H. Schutte, L. Robbins and M. D. Blaufox. JAMA 207(8):1493-1496, 1969.

In a Negro woman who died 10 mo. after bilateral nephrectomy and implantation of a cadaver kidney, autopsy findings included signs of renal graft rejection and disseminated visceral Kaposi's sarcoma. The tumor did not involve the skin (a rare finding) or the kidney transplant; no signs of Kaposi's sarcoma were noted in the pt's. previously removed kidneys or the donor's tissues. The Kaposi's sarcoma had apparently developed very rapidly (suspicious lung shadows appeared only 9 days before death). Possible etiologic factors in this pt. included high-dose immunosuppressive therapy (azathioprine, prednisone, X-rays and actinomycin C), IgA deficiency (also found in pts. with ataxia telangiectasia, a condition often associated with RES tumors), and a herpes virus infection 8.5 mo. before death. Serum obtained from this pt. 2 wk. before death showed IgM levels of only 15 mg/100 ml, and a high immunofluorescence titer (1:80) of EB virus antibodies (when assayed against an EB-producing strain of Burkitt lymphoma cells). It is suggested that local conditions such as the rejection-associated "transplant lung" phenomenon, combined with the depression of immunity, might have permitted the proliferation of an oncogenic virus.

69-1647 FURTHER OBSERVATIONS ON THE IN VITRO ^{65}Zn-BINDING SITES OF HUMAN PROSTATIC TISSUES. (E.) Sato, C. S. (VA Hosp., Houston, Tex.) and F. Györkey. Cancer Res. 29(2): 399-402, 1969.

The in vitro binding of ^{65}Zn by formalin-fixed specimens of normal, hyperplastic and carcinomatous human prostate was studied after desulfation (HCl-methanol) and/or demethoxylation (KOH-ethanol). The results suggested that ^{65}Zn binding results from interaction with carboxyl groups (not with sulfates), that the binding sites are unmasked by KOH, and that this KOH-dependent binding capacity is directly related to the in vivo conc. of zinc (high in hyperplasia, intermediate in normal prostate and low in carcinoma). Curves of ^{65}Zn binding after demethoxylation supported the concept that hyperplasia is not a precursor of the development of carcinoma in the prostate.

69-1648 CHROMOSOME MARKERS IN CULTURED CELLS FROM BURKITT'S LYMPHOMA. (E.) Tough, I. M. (West. Gen. Hosp., Edinburgh, Scotland), D. G. Harnden and M. A. Epstein. Europ. J. Cancer 4(6):637-646, 1968.

A specific marker chromosome (near-terminal constriction of the long arms of a Group C chromosome, presumably #10) was present in 2/7 Burkitt lymphoma cell lines examined (EB2 and EB3), and a similar marker was found in another cell line (GOR). Cell lines EB1, EB1(H), EB4 and RAJI showed a wide variety of chromosomal aberrations, but except for 1 abnormality of chromosome #16 in the RAJI line (present in 2/100 cells), no 2 aberrations were identical, and the #10 marker was not present.

69-1649 ROLE OF THE LDH-ELEVATING VIRUS IN LEUKAEMIA THERAPY BY ASPARAGINASE. (E.) Riley, V. (Pacific Northwest Res. Found., Seattle, Wash.). Nature (London) 220(5173): 1245-1246, 1968.

The lactate dehydrogenase-elevating virus (LDH-V; present as a "silent, benign virus" in many mouse tumors and leukemias) enhanced the therapeutic effects of L-asparaginase (EC-2; from E. coli) in mice bearing asparagine-dependent, LDH-V-free EARAD-1 leukemia. LDH-V apparently acted by reducing asparaginase clearance after a 12-18-hr. lag period.

69-1650 MYELOID LEUKEMIA IN HODGKIN'S DISEASE (HD); CHROMOSOMAL STUDIES. (E.) Ezdinli, E. Z. (Roswell Park Mem. Inst., Buffalo, N. Y.), A. A. Sandberg and J. E. Sokal. Proc. Amer Ass. Cancer Res. 10:23, 1969.

69-1651 CHROMOSOMAL CHARACTERISTICS AND AGGREGATION OF HUMAN PERIPHERAL LEUCOCYTES IN CULTURE AT THE TIME OF ESTABLISHMENT. (E.) Fjelde, A. (Roswell Park Mem. Inst., Buffalo, N. Y.). Proc. Amer. Ass. Cancer Res. 10:25, 1969.

69-1652 PROTEIN SYNTHESIS AND THE GROWTH KINETICS OF EHRLICH ASCITES TUMOR. (E.) Harris, J. W. (U. California Med. Ctr., San Francisco), F. Meyskens and H. M. Patt. Proc. Amer. Ass. Cancer Res. 10:35, 1969.

AUTHOR INDEX

Aaronson, S. A. 1578,1579,1581
Abbott, M. L. 1640
Abelev, G. I. 1364
Abelson, H. T. 1607
Adams, R. A. 1590
Adzhigitov, F. I. 1508
Agarwal, M. K. 1481
Ahmed, M. 1532
Akamatsu, Y. 1438,1454,1491
Albert, R. 1482
Aleksandrowicz, J. 1637
Allcroft, R. 1417
Allison, A. C. 1522
Alper, J. C. 1646
Al'tshtein, A. D. 1563
Alvares, A. P. 1429
Ambrosioni, J. C. 1593
Ambrus, J. L. 1599
Ambs, E. 1357
Anderson, J. 1566
Andrews, H. 1574
Ansfield, F. J. 1470
Aranda, J. M. 1625
Arata, T. 1446
Arcos, J. C. 1423
Argus, M. F. 1423
Armstrong, D. 1552
Ashkenazi, A. 1580
Auerbach, H. 1493

Bader, J. P. 1517,1518,1603
Bagby, S. P. 1616
Bajwa, G. S. 1396
Baker, J. R. 1448
Banerjee, M. R. 1617
Bardin, C. W. 1548
Barnawell, E. B. 1617
Barry, E. J. 1483
Bartlett, G. L. 1492
Bather, R. 1536
Bátkai, L. 1572
Bavetta, L. A. 1396
Behbehani, A. M. 1507
Belamaric, J. 1642
Benedict, R. C. 1458
Benyesh-Melnick, M. 1521
Berman, L. D. 1565
Bernard, C. 1612
Berryman, S. 1569
Beuving, L. 1487
Bielschowsky, F. 1442
Bielschowsky, M. 1442
Bischoff, F. 1494
Biswal, N. 1521
Blair, P. B. 1542,1615
Blakeslee, J., Jr. 1591
Blaufox, M. D. 1646
Blumenson, L. E. 1366
Blunck, J. M. 1401
Bock, F. G. 1501
Boiron, M. 1519,1612
Bolano, C. R. 1507
Bonmassar, E. 1447
Bosmann, H. B. 1575
Bousquet, W. F. 1420
Bowen, J. M. 1618
Bowman, B. G. 1596
Bresch, H. 1497
Bross, I. D. J. 1366
Brown, R. C. 1498
Brues, A. M. 1493
Bryan, G. T. 1470,1471
Bryson, G. 1494
Buffett, R. F. 1600
Burdette, W. J. 1638
Burk, D. 1502
Burmester, B. R. 1531
Buu-Hoï, N. P. 1495

Cabre, J. 1368
Calafat, J. 1543
Campbell, W. F. 1604
Cantaboni, A. 1441
Cardiff, R. D. 1542,1615
Carnes, W. H. 1596
Carranza Garcia, J. V. 1624
Cattaneo, R. 1441
Ceglowski, W. S. 1514
Chang, L. M. S. 1586
Chau, A. S. 1642
Chen, C. C. 1472
Chessin, L. N. 1559
Chesterman, F. C. 1565
Chigirinskii, A. E. 1563
Cholak, J. 1463
Chuat, J. C. 1612
Clapp, N. K. 1469
Cleaver, J. E. 1369
Clifford, P. 1504
Codegone, M. L. 1421
Coggin, J. H., Jr. 1582
Cohen, A. 1626
Cohen, S. M. 1470
Colafranceschi, M. 1413
Coombs, M. M. 1449
Coupey, S. 1477
Covelli, V. 1498
Craddock, V. M. 1431
Craig, A. W. 1469
Cralley, L. J. 1464
Crawford, L. V. 1354
Cremer, N. E. 1608
Croft, C. J. 1449
Csernay, L. 1412
Csuka, O. 1444
Cure, S. F. 1608

Dallavalle, R. 1447
Dao, T. L. 1408
Daoust, R. 1480
Darbyshire, J. H. 1565
Darlington, R. W. 1589
D'Ath, E. F. 1442
Davidson, A. 1488
Dawson, P. J. 1601
DeBaun, J. R. 1484
Deckers, C. 1422
Defendi, V. 1619
De Harven, E. 1552
Denunzio, A. 1405
DeOme, K. 1616
DeOme, K. B. 1542
DeRoche, G. 1493
De-Thé, G. 1593
Diamandopoulos, G. Th. 1577
Diamond, L. 1403,1473
Díaz de León, A. 1623
Diehl, V. 1505
Dienstag, J. 1408
Dillard, R. D. 1476
DiPaolo, J. A. 1474,1479
Di Virgilio, G. 1358
Dmochowski, L. 1618
Dodonova, N. N. 1563
Doell, R. G. 1499
Donelli, M. G. 1633
Donovan, P. 1474
Dubbs, D. R. 1584
Dunkel, V. C. 1592
Dunn, T. B. 1490
Dunning, W. F. 1489
Durant, J. R. 1645

East, J. 1524
Ebert, P. S. 1602
Efskind, J. 1629
Ellsworth, P. A. 1602
Embil, J. A., Jr. 1561
Endo, H. 1363
Endoh, T. 1558
Enomoto, M. 1406
Epstein, M. A. 1648
Epstein, S. S. 1467
Ershoff, B. H. 1396
Ershova, K. P. 1398
Ertürk, E. 1471
Eskins, K. 1408
Eylar, E. H. 1575
Ezdinli, E. Z. 1650

Fantini, F. 1441
Fefer, A. 1611
Feldman, D. G. 1595
Ferrer, J. F. 1511,1597
Fichidzhian, B. S. 1439
Fiel, R. J. 1599
Field, J. B. 1396
Fieldsteel, A. H. 1601
Fischinger, P. J. 1609
Fjelde, A. 1651
Fogh, J. 1552
Foley, G. E. 1590
Forget, A. 1480
Fraumeni, J. F., Jr. 1478
Frei, J. V. 1500
Friedell, G. H. 1489
Friedman, H. 1514

Friend, C. 1598
Fujisawa, T. 1454
Fukunishi, R. 1409
Furst, A. 1468

Gabridge, M. G. 1405
Garattini, S. 1633
García, G. 1623
Gardner, D. 1482
Gaston, M. 1611
Gear, J. H. S. 1564
Ghittino, P. 1421
Ghosh, A. K. 1614
Giao, N. B. 1495
Gibbs, F. 1597
Girardi, A. J. 1619
Gitsch, E. 1433
Giuliani, G. 1447
Glass, A. G. 1639
Goetz, I. E. 1475
Goldfeder, A. 1614
Good, R. A. 1547
Gordon, D. E. 1588
Goudy, B. 1477
Grace, J. T., Jr. 1591,1592, 1600
Granoff, A. 1589
Gravell, M. 1589
Green, M. 1553
Grigorian, A. V. 1631
Grigorovich, N. A. 1440
Grizzard, M. B. 1521
Gross, L. 1595
Grover, P. L. 1430
Groves, G. F. 1510
Grube, D. D. 1493
Gunz, F. W. 1632
Gutmann, H. R. 1472
Györkey, F. 1647

Haase, A. T. 1559
Hageman, P. 1543
Hagopian, A. 1575
Hakomori, S. 1574
Hameed, K. 1644
Hammack, W. J. 1645
Harada, Y. 1404
Harnden, D. G. 1648
Harris, J. W. 1652
Harris, P. N. 1476
Hart, M. L. 1596
Hartmann, P. 1613
Harvey, J. J. 1523,1524
Hays, E. F. 1605
Hecker, E. 1497
Hedler, L. 1418
Henderson, J. S. 1496
Henle, G. 1503,1504,1505
Henle, W. 1503,1504,1505
Henschen, F. 1362
Hill, B. R. 1475
Hirao, F. 1454
Hirata, Y. 1428
Hirayama, T. 1635
Hirschman, S. Z. 1610
Hirshowitz, B. 1627
Ho, H. C. 1593
Hodes, M. E. 1586
Hoffmann, D. 1456
Hollander, V. P. 1352
Holmes, E. C. 1465
Holzner, J. H. 1433
Homburger, F. 1448,1451
Horino, M. 1635
Horn, K. H. 1530
Horoszewicz, J. S. 1592
Horváth, E. 1412
Howard, T. 1502
Howe, C. D. 1510
Huang, C. C. 1594
Huebner, R. J. 1509
Hughes, P. E. 1401
Hughes, R. G. 1618
Hyett, A. W. 1462

Iakovleva, L. A. 1508
Ikegami, R. 1438,1491
Ikuta, F. 1452
Imamura, T. 1594
Infante, F. 1358
Invernizzi, F. 1441
Ioachim, H. L. 1606
Iorio, A. 1570
Irving, C. C. 1485
Ishii, K. 1636
Ishiwata, Y. 1427
Issekutz, B. 1350
Izsak, F. Ch. 1437

Janis, R. 1646
Jänisch, W. 1530
Jasty, V. 1566
Jaszcz, W. 1571
Joffe, A. Z. 1461
Johnson, D. K. 1643
Jones, R., Jr. 1591
Jull, J. W. 1477
Jutz, Ch. 1495

Kada, T. 1363
Kahan, B. D. 1465
Kakefuda, T. 1603
Kambe, S. 1360
Kamimura, N. 1635
Kamitsuka, P. S. 1507
Kamiyama, R. 1635
Kanda, K. 1635
Kane, K. 1635
Kaplan, H. S. 1511
Karamova, E. R. 1545
Kasamatsu, T. 1634
Kasel, J. A. 1559
Kasten, F. H. 1479
Katagiri, K. 1404
Kawachi, T. 1428
Keenan, R. G. 1464
Khoury, G. 1583
Kikui, M. 1438
King, C. L. 1408
King, C. M. 1486
Kinosita, R. 1475
Kinser, R. E. 1464
Kirsten, W. H. 1516
Kit, S. 1584
Kitagawa, M. 1359,1363
Kitano, M. 1445
Klein, E. 1504
Klein, G. 1504,1505
Kobayashi, H. 1365
Kodama, T. 1365
Konishi, Y. 1426
Konno, Y. 1424
Kotrikadze, N. G. 1587
Kouri, R. E. 1582
Kovács, K. 1412
Krispin, M. 1437
Kriukova, I. N. 1528
Krivolapchuk, O. Ia. 1508
Kumanishi, T. 1529
Kumkumadzhian, V. A. 1439
Kuntzman, R. 1429
Kupel, R. E. 1464
Kuznetsov, O. K. 1534
Kwan, H. C. 1593

Lacassagne, A. 1356
Lamerton, L. F. 1367
Landing, B. 1369
Lane, W. T. 1562
Lapin, B. A. 1508
Lasanta, J. 1368
Lasheret, J. 1519
Lausch, R. N. 1573
Lavenda, N. 1358
Law, L. W. 1522
Lazarus, H. 1590
Leaf, D. 1472
Ledin, G., Jr. 1468
Lee, A. M. 1478
Lee, D. K. 1640
Lefkowitz, S. S. 1560
Legator, M. S. 1405
Leong, J. L. 1453
Lerner, E. L. 1631
Levenbuk, I. S. 1563
Levij, I. S. 1450
Levin, W. 1429
Levine, A. S. 1604
Levy, J. A. 1503
Liebelt, A. G. 1548,1616
Liebelt, R. A. 1548,1616
Lindberg, L. G. 1526
Liverud, K. 1629
Lokhvitskii, S. V. 1631
Lynch, J. R. 1464

Machala, O. 1535
Magee, P. N. 1410
Magris, D. 1621
Maher, V. M. 1402
Mahler, D. 1627

ajima, T. 1432
alejka-Giganti, D. 1483
ancinelli, S. 1645
ancini, L. O. 1566
antel, N. 1639
arinuzzi, A. 1620
ark, J. 1527
arquardt, P. 1418
artinez, C. 1547
artinez, I. 1625
asuda, Y. 1456
atsuura, K. 1557
aurer, B. A. 1594
cCombs, R. M. 1521
cCormack, L. J. 1641
cFarlane, E. S. 1561
elnyk, J. 1369
eyskens, F. 1652
icheel, B. 1512
ickey, M. R. 1434
iller, E. C. 1402,1406,1484
iller, J. A. 1402,1406,1484
inami, Y. 1635
ints, I. M. 1398
irand, E. A. 1600
iura, M. 1446
iyamoto, S. 1466
odan, B. 1626
organ, H. R. 1537
orita, R. 1635
orreal, C. E. 1408
orton, D. L. 1465
otoi, M. 1554,1555,1556
otoji, H. 1635

Nadareishvili, A. E. 1587
Nadkarni, J. J. 1504
Nadkarni, J. S. 1504
Nagasawa, H. 1436
Nakamura, K. 1636
Nakanishi, T. 1634
Nakata, Y. 1517,1518
Nandi, S. 1544
Naora, N. 1363
Napalkov, N. P. 1411
Nazerian, K. 1531
Nelson, R. 1474
Niederman, J. C. 1505
Nordenskjöld, B. 1568
Nugmanov, S. N. 1622

Obukh, I. B. 1528
Oettel, H. 1455
Okada, Y. 1445
Okigaki, T. 1479
Olson, C. 1588
O'Neill, C. 1569
Orihata, H. 1635
Osogoshi, K. 1635
Osvaldo, L. 1434
Owen, J. 1488
Ozaki, H. 1636

Pasternak, G. 1512
Patt, H. M. 1652
Paul, P. 1358
Pearson, G. 1504,1505
Pereira, H. G. 1565
Petropulos, S. F. 1446
Petrov, B. A. 1370
Petrovici, A. 1414
Pétursson, G. 1552
Phillips, B. 1486
Pileri, R. 1570
Pina, M. 1553
Piper, W. N. 1420
Pitzurra, M. 1570
Poel, W. E. 1435
Polasa, H. 1553
Polliack, A. 1450
Pope, J. H. 1506
Poppe, E. 1629
Porwit-Bóbr, Z. 1571
Pothier, L. 1590
Pozharisskii, K. M. 1411
Prehn, R. T. 1492
Price, J. M. 1470,1471
Provana, A. 1421
Przybyłkiewicz, Z. 1571
Ptak, W. 1571

Rabstein, L. S. 1607
Rapp, F. 1573
Red'kin, Iu. R. 1399
Reed, W. B. 1369
Reisfeld, R. A. 1465
Rentsch, G. 1443
Rhim, J. S. 1509
Riley, V. 1649
Ritter, R. I. 1544
Robbins, L. 1646
Roberts, B. A. 1417
Romanov, K. P. 1534
Rossi, G. B. 1598
Rosso, R. 1633
Roy, A. K. 1419
Russell, L. T. 1485

Sakakibara, T. 1460
Sakamoto, K. 1635
Salaman, M. H. 1515
Salmela, H. 1630
Samoilovich, L. N. 1399
Sandberg, A. A. 1650
Sato, C. S. 1647
Sato, H. 1635
Sato, K. 1406
Sato, M. 1539
Satterfield, L. C. 1498
Schafer, L. J. 1463
Schell, K. 1562
Scher, W. 1598
Scherrer, R. 1585
Scherzer, M. 1414
Schidlovsky, G. 1532
Schilling, G. 1429
Schlesinger, R. W. 1353
Scholtze, P. 1530
Schreiber, D. 1530
Schutte, H. 1646
Sei, M. 1635
Sendo, F. 1365
Sessa, G. 1457
Shimojo, H. 1549
Shintani, K. 1459
Shirai, Y. 1635
Shustov, V. Ia. 1397
Siegel, J. H. 1646
Simionescu, N. 1414
Simkovic, D. 1446
Sims, P. 1430
Sinkovics, J. G. 1510
Skidmore, J. W. 1462
Smakhtina, O. L. 1622
Smida, J. 1540,1541
Smidová, V. 1540,1541
Smith, J. 1547
Snell, K. C. 1416
Sokal, J. E. 1650
Sokoloff, L. 1416
Somoda, T. 1634
Southam, C. M. 1446
Spears, G. F. S. 1632
Staubesand, J. 1443
Stedman, R. L. 1458
Steel, G. G. 1367
Stenback, W. A. 1525
Stern, E. 1434
Stewart, H. L. 1416
Stoker, M. 1569
Stone, O. J. 1351
Stoytchkov, Y. 1519
Stuart, A. 1590
Stutman, O. 1547
Sugár, J. 1444
Sugarman, G. 1369
Sugimura, T. 1428
Sunagawa, N. 1404
Svoboda, J. 1535
Swann, P. F. 1400,1410
Swaye, P. 1641
Sweeny, P. R. 1536
Sytnik, A. P. 1370
Szybalski, W. 1402

Takakura, K. 1352
Takano, K. 1635
Takashi, T. 1363
Takasugi, N. 1361
Takayama, S. 1425
Takeuchi, T. 1636
Tálas, M. 1572
Talash, M. 1576
Tanabe, T. 1635
Tanaka, S. 1446
Tarba, M. M. 1587
Teather, C. 1574
Tevethia, S. S. 1573
Thiess, A. M. 1455
Thomas, C. G., Jr. 1488
Thomas, M. 1519
Thomas, R. G. 1395

Thomas, R. L. 1395
Thurzo, V. 1540
Tiggelbeck, D. 1502
Timbrell, V. 1462
Ting, R. C. 1520,1522
Tockstein, G. 1553
Todaro, G. J. 1578,1579,1581
Tosi, P. 1413
Tóth, J. 1444
Tough, I. M. 1648
Trávniček, M. 1533
Tregier, A. 1451
Trentin, J. J. 1525
Troll, W. 1457, 1482
Tsetlin, E. M. 1563
Tsubura, E. 1454
Turner, H. C. 1509

Uchida, Y. 1407
Udovich, M. 1621
Uhl, C. 1455
Upton, A. C. 1498
U.S. AEC Lovelace Found.
1371,1372,1373,1374,1375,
1376,1377,1378,1379,1380,
1381,1382,1383,1384,1385,
1386,1387,1388,1389,1390,
1391,1392,1393,1394

Vaage, J. 1546
Van Der Noordaa, J. 1583
Van Duuren, B. L. 1457
Van Hoosier, G. L., Jr. 1525
Van Ordstrand, H..S. 1641
Vasil'eva, N. N. 1563
Vasil'eva, V. A. 1508
Veazey, R. A. 1485
Venkatesan, N. 1423

Wada, S. 1360
Watanabe, I. 1363
Watanabe, K. 1438
Watanabe, M. 1538,1539
Wattenberg, L. W. 1453
Waxman, V. 1569
Wedderburn, N. 1515
Weinstein, I. B. 1481
Weissmann, G. 1457
Weiszfeiler, G. 1572
Wenner, H. A. 1507
Whitcutt, J. M. 1564
Williams, L. B., Jr. 1509
Winocour, E. 1355
Wittekind, D. 1443
Wojcieszek, Z. 1628
Wollmann, R. L. 1516
Wolpaw, S. E. 1641
Wolska, A. 1637
Wong, A. 1536
Woodruff, J. M. 1643
Wright, S. R. 1395
Wynder, E. L. 1456

Yamada, H. 1352
Yamada, N. 1636
Yamafuji, K. 1407
Yamamura, Y. 1454
Yamashita, T. 1549
Yanai, R. 1436
Yasuhira, K. 1415
Yates, V. J. 1566
Yeager, D. 1463
Yoshikura, H. 1513
Yunis, E. J. 1547

Zajac, B. A. 1503
Žemla, J. 1567
Zilber, L. A. 1364
Zil'fian, V. N. 1439
Zimmerman, H. M. 1452
Zur Hausen, H. 1550,1551

SUBJECT INDEX

- 2-ACETYLAMINOFLUORENE (See N-2-Fluorenylacetamide)
- ADRENAL CORTEX
  - cholesterol metabolism _in vitro_, effect of dimethylbenzanthracene, rat: 1477
  - function, effect of ^{90}Sr aerosol, dog: 1381
  - toxicity, dimethylbenzanthracene pathogenesis, rat: 1412,1413
- ADRENAL NEOPLASMS
  - induction, oophorectomy + ACTH + somatotropin, rat: 1414
- AFLATOXIN (S)
  - analysis, soils and peanut products, Israel: 1461
- AFLATOXIN B_1
  - effect on RNA, mechanism, rat liver: 1419
  - hepatoma, trout: 1421
  - metabolite, analysis, method, cows' milk: 1417
- AIR POLLUTION
  - asbestos, analytical methods and instruments: 1462
  - benzpyrene, petrochemical plants: 1399
  - lead compounds from auto exhaust: 1463
  - lung cancer, review: 1360
- ALCOHOL
  - consumption, esophagus cancer, Japan: 1635
    - pancreas cancer, Japan: 1636
- AMINO ACIDS
  - dietary, effect on dimethylaminoazobenzene liver carcinogenesis, rat: 1427
- ANTIBIOTICS
  - effect on nucleolar RNA, tumor cells: 1404
- ANTITUMOR AGENTS
  - antibiotics, s.c. sarcoma, mouse: 1491
  - antimetabolites, effect on tumor viruses, normal cells: 1567,1580,1618
  - asparaginase, effect on virus leukemia, mouse: 1604
    - synergism with LDH-elevating virus, mouse leukemia: 1649
  - cyclophosphamide, effect on viral sarcoma, mouse: 1611
  - effect on methylcholanthrene carcinogenesis, mouse: 1446
  - 6-mercaptopurine, lymphoma, cell-free passage, mouse: 1499
- ASBESTOS
  - air, analysis, methods and instruments: 1462
  - metal content: 1464
- ARSENIC
  - occupational exposure, lung cancer: 1478
- AZOBENZENE, 4-DIMETHYLAMINO-
  - liver tumors
    - effect of dietary amino acids, rat: 1427
    - glycogen metabolism, rat: 1480
- AZOBENZENE, 7,12-DIMETHYLAMINO-
  - hepatoma, antigens, rat: 1422
- AZOBENZENE, 2-METHYL-4-DIMETHYLAMINO-
  - binding, mechanism, rat: 1401
- AZOBENZENE, 3'-METHYL-4-DIMETHYLAMINO-
  - binding, mechanism, rat: 1401
  - effect on liver ultrastructure, rat: 1424
  - liver tumors
    - DNA turnover, premalignant lesions, rat: 1426
- AZOBENZENE, 3'-METHYL-4-DIMETHYLAMINO- (Contd.)
  - liver tumors (Contd.)
    - effect of light and darkness, mouse: 1460
      - oxygen or carbon monoxide, mouse: 1459
- AZOBENZENE, N-METHYL-4-AMINO-
  - and derivatives, mechanism of action, bacterial DNA: 1402
- AZOXYMETHANOL, METHYL- (See Cycasin aglycone)
- AZULENO[3,6,7-cd]PHENALENE
  - s.c. sarcoma, mouse: 1495

- 1,2-BENZANTHRACENE
  - water pollution, petrochemical plants: 139[illegible]
- BENZANTHRACENE, 1:2,5:6-DI-
  - brain or muscle tumors, virus-like particles, mouse: 1452
  - fibrosarcoma, transplantation antigen, guinea pig: 1465
  - leukemia, hamster: 1439
- BENZANTHRACENE, 7,12-DIMETHYL-
  - adrenocortical toxicity, pathogenesis, rat: 1412,1413
  - effect on cholesterol metabolism _in vitro_, rat adrenal: 1477
  - leukemia, hamster: 1439
  - lung tumors, effect of β-naphthoflavone, mouse: 1453
  - lymphoma, polyoma virus sensitivity, mouse: 1568
  - mammary tumors
    - androgen-sterilized rat: 1434
    - effect of β-naphthoflavone, rat: 1453
      - hypothyroidism, rat: 1488
    - hormonal control, rat: 1487
    - pituitary hormone content, rat: 1436
    - transplantable strains, rat: 1489
  - ovary tumors, androgen-sterilized rat: 1434
  - peroxide-induced binding to DNA: 1408
  - tumor ultrastructure, rat: 1409
- BENZO(rst)PENTAPHENE (See Benzpyrene, 3,4,9,10-di-)
- 3,4-BENZPYRENE
  - air pollution, petrochemical plants: 1399
  - brain or muscle tumors, virus-like particles, mouse: 1452
  - DNA interaction: 1407,1408
  - effect on ciliary activity, salamander lung: 1479
  - metabolism
    - effect of methylcholanthrene, rat liver: 1429
      - β-naphthoflavone, mouse or rat: 1453
    - tissue culture: 1473
  - s.c. tumors, effect of propyl gallate or vitamin E, mouse: 1447
  - skin tumors, vital staining, mouse: 1443
- BENZPYRENE, 3,4,9,10-DI-
  - lung adenoma, effect of vehicles or derivatives, mouse: 1451
  - s.c. sarcoma
    - effect of vehicles or derivatives, mouse: 1451
    - rapid induction method, hamster or mouse: 1448

SUBJECT INDEX

BILIARY TRACT NEOPLASMS
  induction, nitrosoguanidine, rat: 1431
BLADDER CARCINOGENESIS
  formamide derivative, rat: 1471
BLADDER NEOPLASMS
  occupational, smoking, chemical factory workers: 1455
BONE NEOPLASMS
  induction
    ^{90}Sr aerosol, dog: 1371
    ^{90}Sr-^{90}Y, hamster: 1379
  osteosarcoma, epidemiology, Norway: 1629
BRAIN NEOPLASMS
  carcinogen-induced, virus-like particles, mouse: 1452
  epidemiology, Israel: 1626
  familial, neonatal cerebellar medulloblastoma, siblings: 1642
    von Recklinghausen's neurofibromatosis: 1640
  induction
    adenovirus 12, mouse: 1558
    bovine papilloma virus, calf: 1588
    Rous sarcoma virus, monkey: 1530
      mouse: 1529
BREAST NEOPLASMS (See Mammary neoplasms, human)
BURKITT LYMPHOMA VIRUS (See under Virus, herpes-type)

CARBAMATE, 1,1-DIPHENYL-2-PROPYNYL-N-CYCLOHEXYL-
  multiple-organ tumors, rodent: 1476
CARBON MONOXIDE
  effect on liver carcinogenesis, mouse: 1459
CARCINOGENESIS, CHEMICAL
  dose-response relationship, mathematical model: 1468
  immunology, review: 1359
  inbred and random-bred mice: 1435
CARCINOGENS (CHEMICAL)
  air pollution, lung cancer, review: 1360
  effect on membranes as index of *in vitro* activities: 1457
    nucleic acids, review: 1363
  interaction with cells *in vitro*: 1403
  malignant transformation, mechanism, hamster: 1474,1475
  mutagenesis, mouse: 1467
  reaction with DNA and protein, cell-free system: 1430
CELL GROWTH KINETICS
  breast cancer, mathematical model, review: 1366
  Ehrlich carcinoma, protein synthesis: 1652
  fluorenylacetamide liver carcinogenesis, rat: 1482
  normal and malignant tissue, review: 1367
  suspension cultures, normal and polyoma-transformed cells: 1569
CERVIX UTERI NEOPLASMS
  epidemiology
    Japan: 1634
    methods: 1624
    Mexico City: 1623
  induction
    contraceptive, mouse: 1490
    methylcholanthrene, mouse: 1432
  premalignant, epidemiology, USSR (Kazakhstan), ethnic groups: 1622

CHROMOSOMES
  adenovirus-infected hamster cells, and antigen production: 1551
    tumors, hamster: 1556
  Hodgkin's disease with leukemia, human: 1650
  markers, Burkitt lymphoma cell lines: 1648
    myeloma: 1645
  Rous virus sarcoma, mouse: 1527
  transformed human WBC cell line: 1651
COCARCINOGENESIS
  unburned tobacco extract, mouse: 1501
COCARCINOGENS (CHEMICAL)
  lysosomal membrane effects as index of *in vivo* activities: 1457
CONNECTIVE TISSUE NEOPLASMS
  muscle, carcinogen-induced, virus-like particles, mouse: 1452
CORPUS UTERI NEOPLASMS
  choriocarcinoma, epidemiology, Puerto Rico: 1625
  epidemiology, Japan: 1634
CROTON OIL
  factor A_1, skin tumors, nucleic acid and protein metabolism, mouse: 1497
CYCASIN
  mutagenesis, *Salmonella*, mouse: 1405
CYCASIN AGLYCONE (methylazoxymethanol)
  mutagenesis, *Salmonella*, mouse: 1405

DIABETES MELLITUS
  and cancer: 1620,1621
DIET (See also under Foods)
  cottonseed meal, aflatoxin hepatoma, trout: 1421
  effect on radiation carcinogenesis, mouse: 1396
  proteins and amino acids, effect on dimethylaminoazobenzene liver carcinogenesis, rat: 1427
DIETARY HABITS
  esophagus cancer, Japan: 1635
  pancreas cancer, Japan: 1636
DIMETHYL SULFATE
  DNA and RNA alkylation, rat: 1410
  metabolism, rat: 1400
DISTRIBUTION
  radioisotopes
    dog: 1386,1387,1388
    inhalation, dog: 1372,1373,1374,1382,1392
      mouse or rat: 1390,1391
    measurement, method: 1394
    preparation of biological samples, method: 1393
    rat: 1389

EAR DUCT NEOPLASMS
  dimethylbenzanthracene-induced, ultrastructure, rat: 1409
ENDOCRINE ABLATION (See also under Hormones)
  hysterectomy, intrasplenic ovary graft tumors, rat: 1433
  oophorectomy
    effect on adenovirus tumors, hamster: 1561
      tumors in intrasplenic ovary graft, rat: 1433

ENDOCRINE ABLATION (Contd.)
  oophorectomy (Contd.)
    + hormones, adrenocortical adenoma, rat: 1414
  orchiectomy, effect on adenovirus tumors, hamster: 1561
ENDOTOXINS
  effect on methylcholanthrene skin tumors, mouse: 1496
ENVIRONMENTAL FACTORS (See also Occupational diseases)
  darkness and light, effect on chemical liver carcinogenesis, mouse: 1460
  time-space leukemia distribution, adults and children, New Zealand: 1632
ENZYMES
  alcohol dehydrogenase, effect of tobacco smoke, cell-free system: 1458
  aminolevulinic acid synthetase, effect of leukemia virus, mouse spleen or liver: 1602
  asparaginase, antileukemic effects, mouse: 1604,1649
  ATPase, membrane-bound, methylcholanthrene skin tumors, mouse: 1444
  cell membrane, virus-transformed cells: 1575
  DNA-mobilizing, effect of antimetabolites, polyoma-infected normal cells: 1567
  hydroxyfluorenylacetamide activation, structure of nucleic acid adducts: 1486
  RNA polymerase, effect of Shope fibroma virus, normal cells: 1586
EPIDEMIOLOGY
  all tumors
    bovine leukosis-enzootic farms, Poland (Cracow): 1637
    diabetes mellitus: 1620,1621
  brain tumors, Israel: 1626
  cervix cancer
    Japan: 1634
    methods: 1624
    Mexico City: 1623
  choriocarcinoma, Puerto Rico: 1625
  esophagus cancer
    dietary factors, Japan: 1635
    smoking, Japan: 1635
      South Africa (Transkei): 1638
  leukemia
    children, California (Los Angeles): 1639
    time-space distribution, New Zealand: 1632
  lung cancer, USSR, women, smoking: 1631
  lymphosarcoma of stomach, Finland: 1630
  multiple skin cancers, Poland (Gliwice): 1628
  osteosarcoma, Norway: 1629
  pancreas cancer, smoking and diet, Japan: 1636
  premalignant cervix lesions, USSR (Kazakhstan), ethnic groups: 1622
  skin cancer, fishermen, Spain: 1368
    Israel (northern): 1627
  uterus cancer, Japan: 1634
EPSTEIN-BARR VIRUS (See under Virus, leukemia/lymphoma)
ESOPHAGUS NEOPLASMS
  burn scar stenosis: 1370
  epidemiology, Japan, smoking and diet: 1635
    South Africa (Transkei), smoking: 1638
  induction, methylnitrosoaniline, rat: 1411
ESTRADIOL (See under Hormones)
DL-ETHIONINE
  hepatoma, DNA turnover, premalignant lesions, rat: 1426

FLAVONES
  effect on dimethylbenzanthracene carcinogenesis, mouse or rat: 1453
N-2-FLUORENYLACETAMIDE
  and derivatives, mechanism of action, bacterial DNA: 1402
  liver tumors, DNA and cell turnover, early stages, rat: 1426,1482
N-2-FLUORENYLACETAMIDE, N-HYDROXY-
  binding, mechanism, rat liver: 1481,1483,1484, 1485
  enzymatic activation, nucleic acid adducts: 1486
FOODS (See also under Diet)
  cows' milk, aflatoxin content, analytical method: 1417
  nitrosamine content, analysis, method: 1418
  peanuts, aflatoxin content, Israel: 1461

GASTROINTESTINAL CARCINOGENESIS
  diethylnitrosamine, mouse: 1469
  methylnitrosoaniline, esophagus, rat: 1411
  nitrosoguanidine, rat: 1431
GENETICS, ANIMAL
  carcinogen bioassays, inbred and random-bred mice: 1435
  high- and low-mammary cancer mice, hyperplastic mammary nodules: 1616
  mouse with Friend virus leukemia: 1601
  pituitary graft response, mouse mammary gland: 1548
  urethan carcinogenesis or teratogenesis, mouse: 1442,1466
GENETICS, CELLULAR
  SV40-transformed cells: 1584
GENETICS, HUMAN
  "cancer-prone" diseases, SV40 transformation of fibroblasts: 1581
  cerebellar medulloblastoma, newborn sisters: 1642
  diffuse interstitial pulmonary fibrosis, lung cancer, brothers: 1641
  familial neurofibromatosis with brain tumors: 1640
  xeroderma pigmentosum, mechanism of solar carcinogenesis: 1369
GENITAL NEOPLASMS, FEMALE
  Fallopian tube, tuberculous salpingitis: 1644

HEMATOPOIESIS
  RBC, effect of leukemia virus-infected cells, mouse: 1598
HORMONES (See also Endocrine ablation)
  androgen, sterilization, chemical ovary or mammary carcinogenesis, rat: 1434
  contraceptive, breast cancer, adolescent: 1437
    cervix tumor, mouse: 1490
  effect on DNA, hyperplastic mammary nodule, mouse: 1617

- HORMONES (Contd.)
  - effect on (Contd.)
    - premalignant dimethylbenzanthracene mammary tumors, rat: 1487
  - estradiol
    - leukemogenesis, mechanism, mouse: 1440
    - lymphoma, polyoma virus sensitivity, mouse: 1568
  - interactions, plasma cell tumors, mechanism, review: 1352
  - metabolic status, cervix or uterus cancer, Japan: 1634
  - prolactin and somatotropin, pituitary levels, rat with induced mammary tumor: 1436
  - somatotropin + ACTH, adrenal tumors, oophorectomized rat: 1414
  - steroid, vaginal tumors, mouse, review: 1361
- HYDROCARBONS, POLYCYCLIC AROMATIC
  - reactions with DNA and protein, cell-free system: 1430
- HYDROXYLAMINE DERIVATIVES
  - sarcoma, structure-activity relationship, rat: 1472

- IMMUNE SERUM
  - effect on Moloney sarcoma/leukemia virus tumors, mouse: 1522
- IMMUNITY
  - adenovirus-induced hamster tumors: 1553,1559, 1560,1562,1573
  - cancer, review (book): 1350,1364
  - chemical carcinogenesis, review: 1359
  - dibenzanthracene fibrosarcoma, guinea pig: 1465
  - effect of mammary tumor virus, mouse: 1546, 1547
    - methylcholanthrene, mouse: 1415,1492
  - human cancer, review: 1351,1358
  - liver and hepatoma antigens, rat: 1422
  - ^{90}Sr-induced chloroleukemia, strain effects, rat: 1383
  - SV40
    - antigens, PARA-adenovirus 12-induced tumor, hamster: 1573
    - hamster tumors: 1562
    - infected normal cells: 1619
  - transplantation, mouse tumors: 1445
  - viral leukemia or lymphoma, mouse: 1512,1514, 1515
    - rat: 1596,1597,1608
  - Yaba virus, monkey: 1507
- IMMUNITY DISORDERS
  - IgA deficiency, with rejected kidney graft and Kaposi's sarcoma: 1646
- IMMUNOSUPPRESSIVE AGENTS
  - possible tumor virus stimulation, kidney graft with Kaposi's sarcoma: 1646
- INJURIES (See also under Scar tissue)
  - chemical burns, esophagus cancer: 1370
- INTERFERON
  - polyoma virus induction, normal cells: 1572
  - response, leukemia virus-infected cell lines: 1510
  - Rous sarcoma virus induction, chick embryo cells: 1538,1539
- KIDNEY
  - graft, complications of rejection, Kaposi's sarcoma: 1646
  - nucleic acids, effect of carcinogens, rat: 1410
- KIDNEY CARCINOGENESIS
  - formamide derivative, rat: 1471
  - methylcholanthrene, monkey: 1416
  - thiazole derivatives, rat: 1470

- LEAD COMPOUNDS
  - automobile exhaust, air transport: 1463
- LEUKEMIA, EXPERIMENTAL (See also under Virus, leukemia/lymphoma)
  - EARAD-1 radiation-induced (mouse), effect of enzyme + virus: 1649
  - ^{90}Sr chloroleukemia, age, strain and radiation effects, rat: 1383
  - virus isolation attempt, monkey: 1508
- LEUKEMIA, HUMAN
  - child, viral etiology, review: 1357
  - epidemiology, children, California (Los Angeles): 1639
    - time-space distribution, New Zealand: 1632
  - erythromyeloid, radiation-induced: 1397
  - Hodgkin's disease, karyotype: 1650
  - virus-like particles: 1506
  - xeroderma pigmentosum, child: 1369
- LEUKEMOGENESIS, EXPERIMENTAL (See also under Radiation and Virus)
  - dibenzanthracene, hamster: 1439
  - dimethylbenzanthracene, hamster: 1439
    - tumor ultrastructure, rat: 1409
  - estradiol, mechanism, mouse: 1440
  - methylcholanthrene, mouse: 1438
    - cell-free passage: 1499
  - 6-mercaptopurine, cell-free passage, mouse: 1499
  - methylnitrosourea, mouse: 1500
  - mineral oil plasmacytoma, mouse: 1441
    - role of sex hormones, mouse, review: 1352
  - urethan, tumor ultrastructure, mouse: 1498
- LEUKEMOID REACTION
  - to adjuvant, methylcholanthrene-treated mouse: 1415
- LEUKOSIS (LEUKEMIA), AVIAN (See also under Marek's disease)
  - viral, chicken, tumors in ducklings: 1540
  - virus contamination, chick embryo cells: 1534
- LEUKOSIS (LEUKEMIA), BOVINE
  - enzootic area, human cancer incidence, Poland (Cracow): 1637
- LIVER
  - carcinogen effects, rat: 1410,1419,1423,1424, 1429,1480,1481,1483,1484,1485
  - radiation effects, hamster: 1385
  - role in dimethylbenzanthracene adrenal necrosis, rat: 1413
- LIVER CARCINOGENESIS
  - acetylaminofluorene, DNA metabolism, rat: 1426
  - aflatoxin, trout, 1421
  - dimethylaminoazobenzene, rat: 1427,1480
  - diethylnitrosamine, mouse: 1469

LIVER CARCINOGENESIS (Contd.)
  - diethylnitrosamine (Contd.)
    - + tryptophan, rat: 1428
  - dimethylnitrosamine, pathogenesis, mouse: 1425
  - ethionine, DNA metabolism, rat: 1426
  - fluorenylacetamide, cell turnover, rat: 1482
  - immunology, rat: 1422
  - mechanism, review: 1356
  - methyldimethylaminoazobenzene
    - DNA metabolism, rat: 1426
    - effect of light or darkness, mouse: 1460
      - oxygen or carbon monoxide, mouse: 1459
  - nitrosoguanidine, rat: 1431

LIVER NEOPLASMS
  - hemangioendothelioma, monkey: 1643

LUNG
  - cilia, effect of benzpyrene, salamander: 1479
  - nucleic acids, effect of carcinogens, rat: 1410
  - radioisotope distribution
    - aerosols, dog: 1374,1382,1392
      - rat or mouse: 1390,1391
    - dog: 1386,1387
    - rat: 1380,1389
  - toxicity, radioisotope aerosol, dog: 1374

LUNG CARCINOGENESIS
  - ^{144}Ce aerosol, rat: 1378
  - dibenzpyrene, effect of vehicles or derivatives, mouse: 1451
  - diethylnitrosamine, mouse: 1469
  - dimethylbenzanthracene, effect of β-naphthoflavone, mouse: 1453
  - methylcholanthrene + nitroquinoline oxide, rabbit: 1454

LUNG DISEASES
  - familial diffuse interstitial pulmonary fibrosis, lung cancer, brothers: 1641
  - non-malignant, and lung cancer, women: 1631
  - TB, with tuberculous salpingitis and Fallopian tube cancer: 1644

LUNG NEOPLASMS
  - air pollution, review: 1360
  - epidemiology, USSR, women, smoking: 1631
  - familial diffuse interstitial pulmonary fibrosis, smoking, brothers: 1641
  - occupational, arsenic exposure: 1478
    - chemical factory workers, smoking: 1455

LYMPHOMA, MALIGNANT, EXPERIMENTAL
  - mineral oil plasmacytoma, mouse: 1352,1441
  - spontaneous or induced, polyoma virus sensitivity, mouse: 1568

LYMPHOMA, MALIGNANT, HUMAN
  - Burkitt, cell lines, karyotype: 1648
  - Hodgkin's disease, with leukemia, karyotype: 1650

MALIGNANT TRANSFORMATION
  - chemical, mechanism, hamster: 1475
  - human WBC cell line, karyotype: 1651
  - tuberculous salpingitis to tubal cancer: 1644
  - ulcer to lymphosarcoma, stomach: 1630
  - viral, cell surface properties: 1574,1575

MAMMARY CARCINOGENESIS
  - contraceptive (estrogen + progesterone), adolescent: 1437

MAMMARY CARCINOGENESIS (Contd.)
  - dimethylbenzanthracene
    - effect of β-naphthoflavone, rat: 1453
    - hormone effects, rat: 1434,1436,1487,1488
    - transplantable tumor lines, rat: 1489
    - tumor ultrastructure, rat: 1409
  - formamide derivative, rat: 1471
  - thiazole derivatives, rat: 1470

MAMMARY GLAND
  - hyperplastic nodules, effect of mammary tumor virus or hormones, mouse: 1617
  - pituitary graft response, genetic regulation, mouse: 1548

MAMMARY NEOPLASMS, EXPERIMENTAL (See also Virus, mammary tumor)
  - cat, virus particles: 1595
  - virus replication *in vitro*, mouse: 1542

MAMMARY NEOPLASMS, HUMAN
  - cell growth kinetics, mathematical model, review: 1366
  - estrogen + progesterone contraceptive, adolescent: 1437

MAREK'S DISEASE (See also under Leukosis, avian)
  - virus morphology: 1531, 1532

MAREK'S DISEASE VIRUS (See under Virus, herpes-type)

MEMBRANES
  - lysosomal, disruption by carcinogens or tumor-promoting agents, as index of *in vivo* activities: 1457

METALS
  - analysis, asbestos: 1464

METHANESULFONATE, METHYL-
  - DNA and RNA alkylation, rat: 1410
  - metabolism, rat: 1400

METHANOL, METHYLAZOXY- (See Cycasin aglycone)

3-METHYLCHOLANTHRENE
  - brain or muscle tumors, virus-like particles, mouse: 1452
  - cervix carcinoma *in situ*, mouse: 1432
  - effect on
    - chromatin template activity, rat liver: 1420
    - dimethylnitrosamine metabolism, rat liver: 1423
    - mechanism: 1407,1408
    - immunity, newborn mouse: 1415
    - microsomal hemoprotein, rat liver: 1429
  - kidney tumor, monkey: 1416
  - leukemia
    - mouse: 1438
    - polyoma virus sensitivity, mouse: 1568
  - lung tumors, rabbit: 1454
  - lymphoma, cell-free passage, mouse: 1499
  - sarcoma
    - effect of antitumor agents, mouse: 1446
      - tumor viruses, mouse: 1446,1568
    - immunity, mouse: 1445,1492
  - skin tumors
    - effect of antitumor agent or tumor virus, mouse: 1446
      - endotoxin, mouse: 1496
    - membrane-bound ATPase, mouse: 1444

MUTAGENESIS
  - chemical carcinogens, mouse: 1467
  - *Salmonella*, cycasin and its aglycone, mouse: 1405

MYELOMA, MULTIPLE
- marker chromosomes, human: 1645

β-NAPHTHOFLAVONE
- effect on dimethylbenzanthracene carcinogenesis, mouse or rat: 1453

α-NAPHTHYLAMINE
- analysis, tobacco smoke: 1456

β-NAPHTHYLAMINE
- analysis, tobacco smoke: 1456

NASOPHARYNX NEOPLASMS
- Chinese, herpes-type virus particles, *in vitro*: 1593

NEOPLASMS EXPERIMENTAL
- blood and tissue cell counts, method: 1633
- cell growth kinetics, review: 1367
- Ehrlich carcinoma (mouse), cells, effect of filtered or unfiltered tobacco smoke: 1502
  - growth kinetics and protein synthesis: 1652
  - transplantation immunity: 1445
- polyoma virus sensitivity, spontaneous or induced mouse tumors: 1568

NEOPLASMS, HUMAN
- biochemical abnormalities, review: 1350
- cell growth kinetics, review: 1367
- diabetes mellitus: 1620,1621
- epidemiology, bovine leukosis-enzootic farms, Poland (Cracow): 1637
- immunology, review: 1350,1351
- virus-like particles (WBC) and serum-virus complex, review: 1358

N-(4-[5-NITRO-2-FURYL]-2-THIAZOLYL) FORMAMIDE
- urinary tract and mammary tumors, rat: 1471

4-(5-NITRO-2-FURYL)THIAZOLE, 2-(2-FORMYLHYDRAZINO)-
- and derivatives, carcinogenesis, rat: 1470

4-NITROQUINOLINE 1-OXIDE
- effect on nucleolar RNA, tumor cells: 1404
- lung tumors, methylcholanthrene-treated rabbit: 1454

NITROSAMINE DERIVATIVES
- analysis, foods, method: 1418

NITROSAMINE, DIETHYL-
- dose-response relationship, mouse: 1469
- hepatoma, effect of tryptophan, rat: 1428

NITROSAMINE, DIMETHYL-
- DNA and RNA alkylation, rat: 1410
- liver sarcoma, pathogenesis, mouse: 1425
- metabolism, effect of other carcinogens, rat liver: 1423

N-NITROSOANILINE, N-METHYL-
- esophagus tumors, rat: 1411

NITROSOGUANIDINE DERIVATIVES
- N'-nitro-N-nitroso-N-methylguanidine, liver and stomach tumors, rat: 1431

N-NITROSOUREA, N-METHYL-
- DNA and RNA alkylation, rat: 1410
- leukemia, mouse: 1500
- metabolism, rat: 1400

NUCLEIC ACIDS, DNA
- effect of carcinogens: 1402,1406,1407,1408, 1410,1430,1440,1485,1486,1497
  - review: 1363
- premalignant liver lesions, rat: 1426

NUCLEIC ACIDS, DNA (Contd.)
- repair defect, and solar carcinogenesis, xeroderma pigmentosum: 1369
- tumor virus-infected cells: 1355,1513,1516, 1517,1518,1549,1567,1582,1585,1610,1617
  - review: 1354,1355,1363

NUCLEIC ACIDS, RNA
- effect of carcinogens: 1404,1406,1410,1419, 1420,1481,1485,1486,1497
  - review: 1363
- properties, avian myeloblastosis virus (BAI Strain A): 1533
  - mouse leukemia viruses: 1516,1603
  - tumor viruses, review: 1354,1363
- tumor virus-infected cells: 1521,1586,1615

NUCLEOPROTEINS
- spleen, elasticity, estradiol leukemogenesis, mouse: 1440

OCCUPATIONAL DISEASES
- arsenic exposure, lung cancer: 1478
- cancer incidence, bovine leukosis-enzootic farms, Poland (Cracow): 1637
- lung and bladder cancer, smoking, chemical factory workers: 1455
- skin cancer, sun exposure, fishermen, Spain: 1368

OIL, MINERAL (See also under Petroleum)
- plasmacytoma, mouse: 1441
- sex hormone influence, mouse, review: 1352

OVARY NEOPLASMS
- induction, dimethylbenzanthracene, androgen-sterilized rat: 1434
- intrasplenic ovarian graft, effect of endocrine ablation, rat: 1433
- isolation of sarcoma virus, human: 1613

OXYGEN
- effect on liver carcinogenesis, mouse: 1459

PANCREAS NEOPLASMS
- smoking and diet, Japan: 1636

PERITONEAL NEOPLASMS
- sarcoma, induction, hydroxylamine derivatives, rat: 1472

PETROLEUM (See also under Oil, mineral)
- automobile exhaust, lead compounds in air: 1463
- processing plants, air pollution, benzpyrene: 1399
  - water pollution, benzanthracene: 1398

PITUITARY
- hormone levels, rat with induced mammary tumor: 1436

PITUITARY NEOPLASMS
- induction, ^{131}I, rat: 1377

PLANT EXTRACTS
- pokeweed mitogen, effect on adenovirus carcinogenesis, hamster: 1559

PLASMACYTOMA
- marker chromosomes, human: 1645
- mineral oil-induced, mouse: 1352,1441

PLASTICS
- s.c. sarcoma, rat: 1493,1494

POLYOMA VIRUS (See under Virus, papova)
PROPYL GALLATE
  effect on benzpyrene sarcoma, mouse: 1447
PROSTATE NEOPLASMS
  zinc binding, mechanism: 1647
PROTEINS
  reaction with carcinogens, cell-free system: 1430

QUINOLINE, 4-HYDROXYAMINO-, 1-OXIDE
  diacetyl derivative, reactivity with nucleic acids: 1406

RADIATION
  effect on
    liver, hamster: 1385
    ^{90}Sr-induced chloroleukemia, age and strain effects, rat: 1383
    transplantation immunity, mouse tumors: 1445
  scanning, exptl. and human, apparatus and methods: 1384
  sensitivity, normal and SV40-transformed hamster cells: 1582
RADIATION CARCINOGENESIS
  ^{144}Ce aerosol, lung, rat: 1378
  effect of diet, mouse: 1396
  ^{131}I, aerosol or i.v., thyroid and pituitary, rat: 1377
  inhaled radioisotopes, dog: 1376
  ^{90}Sr aerosol, bone, dog: 1371
  ^{90}Sr-^{90}Y, bone, hamster: 1379
  sunlight, skin, fishermen, Spain: 1368
    xeroderma pigmentosum: 1369
RADIATION LEUKEMOGENESIS
  erythromyeloid leukemia, human: 1397
  ^{90}Sr aerosol, dog: 1371
  tumor ultrastructure, mouse: 1498
RADIOACTIVE ISOTOPES AND ELEMENTS
  aerosols
    distribution, dog: 1372,1373,1374,1382, 1392
      mouse or rat: 1380,1390,1391
    effect on adrenal function, dog: 1381
    lung carcinogenesis, rat: 1378
    toxicity, dog: 1372,1373,1374,1376,1381
      rat: 1378
  bone tumors, hamster or dog: 1371,1379
  carcinogenesis, rat: 1377,1378
  distribution, dog: 1386,1387,1388
    rat: 1389,1395
  leukemia, dog: 1371
  metabolism, preparation and measurement of biological samples: 1393,1394
  toxicity, hamster or dog: 1375,1379
RETICULOENDOTHELIAL NEOPLASMS
  Kaposi's sarcoma, complication of kidney graft rejection: 1646
RETICULOENDOTHELIAL SYSTEM
  zymosan stimulation, effect on ^{137}Cs deposition, rat lung: 1380

SCAR TISSUE (See also under Injuries)
  chemical burns, esophagus cancer: 1370
SCAR TISSUE (Contd.)
  vaccination, sun exposure, carcinoma, xeroderma pigmentosum: 1369
SEX
  difference, adenovirus tumors, hamster: 1561, 1562
    plasma cell tumors, mouse, mechanism, review: 1352
    SV40 tumors, hamster: 1562
    urethan skin tumors, mouse: 1442
SKIN CARCINOGENESIS
  antitumor antibiotics, mouse: 1491
  azuleno[5,6,7-cd]phenalene, mouse: 1495
  benzpyrene, mouse: 1443,1447
  bovine papilloma virus, calf: 1588
  croton oil, mouse: 1497
  dibenzpyrene, mouse: 1448,1451
    hamster: 1448
  methylcholanthrene
    effect of endotoxin, mouse: 1496
      viruses or antitumor agents, mouse: 1446
    membrane-bound ATPase, mouse: 1444
    tumor immunity, mouse: 1492
  plastics, rat: 1493,1494
  Shope papilloma virus, rabbit: 1587
  steroids, structure-activity relationship, mouse: 1449
  sunlight, fishermen, Spain: 1368
    mechanism, xeroderma pigmentosum: 1369
  tars, historical review: 1362
  unburned tobacco extract, mouse: 1501
  urethan, strain and sex difference, mouse: 1442
  vitamin A palmitate, atypia, hamster cheek pouch: 1450
  Yaba virus, s.c. histiocytoma, immunology, monkey: 1507
SKIN NEOPLASMS
  epidemiology, Israel (northern): 1627
  multiple, epidemiology, Poland (Gliwice): 1628
  sun exposure, fishermen, Spain: 1368
    xeroderma pigmentosum: 1369
SOIL
  aflatoxin content, Israel: 1461
SPINAL CANAL NEOPLASMS
  adenovirus induction, hamster or mouse: 1557, 1558
SPINE
  effect of methylcholanthrene, monkey: 1416
STEROIDS
  skin and s.c. tumors, structure-activity relationship, mouse: 1449
STOMACH DISEASES
  ulcer, lymphosarcoma: 1630
STOMACH NEOPLASMS
  induction, nitrosoguanidine, rat: 1431
  lymphosarcoma, epidemiology, Finland: 1630
SV40 (See under Virus, papova)

TARS
  carcinogenesis, historical review: 1362
TERATOGENESIS
  urethan, strain difference, mouse: 1466
THIAZOLE DERIVATIVES
  carcinogenesis, rat: 1470

THYMUS
- effect on mammary virus carcinogenesis, mouse: 1547

THYROID DISEASES
- hypothyroidism, effect on dimethylbenzanthracene mammary carcinogenesis, rat: 1488

THYROID NEOPLASMS
- induction, ^{131}I, rat: 1377

TOBACCO
- extract, effect on lysosomal membranes as index of cocarcinogenic effect: 1457
- unburned, tumor promoters, mouse skin: 1501

TOBACCO SMOKE
- filtered, effect on tumor cells *in vitro*: 1502
  - or unfiltered, effect on enzymes, cell-free system: 1458
- α- and β-naphthylamine content: 1456

TOBACCO SMOKING
- esophagus cancer, Japan: 1635
  - South Africa (Transkei): 1638
- lung cancer, familial lung disease, brothers: 1641
  - women, USSR: 1631
- occupational lung and bladder cancer, chemical factory workers: 1455
- pancreas cancer, Japan: 1636

α-Tocopherol (See under Vitamins)

TOXICITY
- dimethylbenzanthracene, pathogenesis, adrenal, rat: 1412,1413
- radioisotopes, aerosols, dog: 1372,1373,1374,1375,1376
  - rat: 1378

TRAUMA (See Injuries)

TRYPTOPHAN
- cocarcinogenesis, rat liver: 1428

URETHAN
- leukemia, ultrastructure, mouse: 1498
- skin tumors, strain and sex difference, mouse: 1442
- teratogenesis, strain difference, mouse: 1466

UTERUS NEOPLASMS (See under Corpus uteri)

VAGINA NEOPLASMS
- induction, steroid hormones, mouse, review: 1361

VIRAL CARCINOGENESIS
- review: 1350,1353,1363,1364

VIRUS
- DNA-containing, properties of DNA and mechanism of transformation, review: 1354
- herpes, infection, with kidney graft, Kaposi's sarcoma: 1646
- herpes-like, Lucké kidney adenocarcinoma (frog): 1589
- infectious mononucleosis, comparison to Epstein-Barr (Burkitt lymphoma) virus: 1505
  - hamster tumor: 1590
- lactate dehydrogenase-elevating, synergism with antitumor enzyme, mouse leukemia: 1649
- non-oncogenic, detection of avian leukosis virus, chick embryo cells: 1534

VIRUS (Contd.)
- non-oncogenic (Contd.)
  - effect on methylcholanthrene carcinogenesis, mouse: 1446
- particles resembling, carcinogen-induced brain or muscle tumors, mouse: 1452
  - WBC, human cancer, review: 1358
- reo-, type 3, effect on Burkitt lymphoma cell lines: 1503
- RNA-containing, properties of RNA, review: 1354
- Sendai, Rous sarcoma virus rescue, mixed (hamster + chicken) cell cultures: 1535
- Shope fibroma (rabbit), effect on RNA, normal cells: 1586
  - viral and host cell DNA, normal cells: 1585
- Yaba (pox), immunology, monkey: 1507

VIRUS, ADENO-
- bovine type 3, hamster and mouse tumors: 1565
- chick embryo lethal orphan (CELO), fibrosarcoma, hamster: 1566
- DNA induction as index of tumor-inducing capacity, normal cells: 1549
- mechanism of tumor induction, review: 1353
- PARA-adenovirus 12, transformation, SV40 antigens, hamster tumor: 1573
- SA7 (simian), hamster tumors: 1563,1564
- SV20 (simian), hamster tumors: 1563
- type 12
  - CNS tumors, mouse: 1558
  - hamster tumors: 1552,1557,1559
    - sex difference: 1561,1562
  - karyotype of infected cells or hamster tumor: 1550,1551,1556
  - replication and transformation, hamster cells: 1554,1555,1556
  - tumor immunology: 1551,1553,1560

VIRUS, HERPES-TYPE
- Burkitt lymphoma (Epstein-Barr; human)
  - antibodies, Kaposi's sarcoma with rejected kidney graft: 1646
  - Chinese nasopharynx tumor *in vitro*: 1593
  - effect of reovirus 3 *in vitro*: 1503
  - infectious mononucleosis
    - comparison of viruses: 1505
    - induction, human cancer: 1591
  - surface antigens, cell lines: 1504,1592
- Marek's disease (chicken), morphology: 1531,1532

VIRUS, LEUKEMIA/LYMPHOMA (See also under Virus, herpes-type)
- avian leukosis
  - BAI myeloblastosis (chicken), duckling tumors: 1540
    - Strain A, RNA analysis: 1533
  - detection, chick embryo cells: 1534
  - Mill Hill #2 reticuloendothelioma (chicken), duckling tumors: 1540
  - RAV-1 or RAV-2, surface ultrastructure of infected cells: 1537
- 334C (mouse), effect of Friend virus leukemia: 1600
- Friend (mouse)
  - effect of another leukemia virus: 1600
  - host genetics: 1601
  - immunosuppression: 1514,1515
  - nuclear size, mouse spleen: 1599

VIRUS, LEUKEMIA/LYMPHOMA (Contd.)
  Friend (mouse) (Contd.)
    pathogenicity, *Praomys (Mastomys) natalensis*: 1523
    role of cellular DNA in replication: 1513
    splenic and liver enzymes: 1602
  Graffi (mouse), interaction with Gross virus: 1512
  Gross (mouse)
    bioassay, method: 1606
    development of transplanted thymoma: 1605
    interaction with Graffi virus: 1512
  guinea pig lymphoma: 1595
  hamster lymphoma (D-9), isolation and properties: 1525
  human
    cell lines, cloning efficiency: 1594
    leukemia, herpes-like, morphology: 1506
    review: 1357
  methylcholanthrene or 6-mercaptopurine lymphoma, mouse: 1499
  Moloney (mouse)
    helper virus, isolation and properties: 1609
    immunoglobulin synthesis, rat: 1608
    immunosuppression: 1515
    sarcoma-inducing variant: 1607
    virus complex, isolation and properties of RNA, transformed rat cells: 1521
    YAC lymphoma, polyoma virus sensitivity: 1568
  monkey, isolation attempt: 1508
  mouse
    cell line, erythropoietic effects: 1598 1516
    erythroblastosis virus, RNA analysis:
    ultrafiltration, method: 1509
  radiation leukemia virus (rat), lymphoma antigens: 1596,1597
  RadLV (radiation leukemia virus), lymphoma, rat or mouse: 1511
  Rauscher (mouse)
    effect of antitumor enzyme: 1604
    interferon response, cell lines: 1510
    RNA ultrastructure: 1603
    spleen and liver enzymes: 1602
VIRUS, MAMMARY TUMOR
  cat mammary carcinoma: 1595
  distribution, mouse: 1544
  effect on
    DNA, hyperplastic mammary nodule, mouse: 1617
    mammary graft response to pituitary graft, mouse: 1548
  hyperplastic mammary nodules, high- and low-cancer mouse strains: 1616
  immunology, mouse: 1546
  infectivity, relation to RNA synthesis, mouse: 1615
  isolation and properties, mouse: 1543
  milk transmission, mouse: 1614
  replication, mouse mammary tumors *in vitro*: 1542
  role of thymus, mouse: 1547
  specific soluble antigen, mouse: 1545
  Type A particles, morphology, mouse, review: 1365
VIRUS, PAPOVA (papilloma-polyoma-vacuolating)
  bovine papilloma, tumor histology, calf: 1588
  DNA, interaction with cellular DNA, review: 1355
  polyoma
    effect of antitumor agent, normal cells: 1618
    interferon induction, normal cells: 1572
    sensitivity, spontaneous or induced mouse tumors: 1568
    serum antibodies, hamster: 1571
    thymidine kinase, effect of antimetabolites, normal cells: 1567
    transformation, cell surface properties: 1569,1574
    tumor histology, mouse: 1570
  Shope (rabbit), skin carcinoma, virus propagation: 1587
  simian, transformation, cell membrane enzymes: 1575
  SV40
    antigens, PARA-adenovirus 12 tumor, hamster: 1573
    effect of antimetabolite, hamster cells: 1580
    histology of hamster tumors: 1577
    radiation response, hamster cells: 1582
    sex difference in tumor induction, hamster: 1562
    transformation
      cell genetics: 1584
      fibroblasts from normal or cancer-prone persons: 1581
      membrane and surface properties: 1574, 1575
      morphology and antigens, human embryo cells: 1583
      mouse embryo cells: 1578,1579
    transplantation antigen, infected normal cells: 1619
    tumor cell lines, virus production *in vitro* and in hamster: 1576
VIRUS, SARCOMA
  B77 (chicken), tumor induction, duckling: 1540
    quail: 1541
  Fujinami (chicken), tumor induction, duckling: 1540
  Harvey (mouse), dual action, intact or thymectomized mouse: 1524
    pathogenicity, *Praomys (Mastomys) natalensis*: 1523
  isolation, human ovarian tumor: 1613
  Moloney (mouse)
    bovine embryo cells: 1519
    cyclophosphamide therapy: 1611
    DNA dependence, cell line: 1610
    helper virus, isolation and properties: 1609
    leukemia virus, effect of antiserum: 1522
      isolation and properties of RNA, transformed rat cells: 1521
    rat tumor, new viral serotype: 1520
    replication, human cell line: 1612
    ultrafiltration, method: 1509
  mouse, transformation, conditions, rat embryo cells: 1517

VIRUS, SARCOMA (Contd.)
- Rous (chicken)
  - brain tumors, monkey: 1530
    - mouse: 1529
  - chick embryo cultures: 1536
  - detection of avian leukosis virus, chick embryo cells: 1534
  - interferon induction, chick embryo cells: 1538,1539
  - mouse tumors, biological properties: 1527 1528
  - rat tumors, ultrastructure: 1526
  - rescue by Sendai virus, mixed (hamster + chicken) cell cultures: 1535
  - surface ultrastructure of infected cells: 1537
  - transformation, cell surface properties: 1574
    - role of DNA, chick embryo cells: 1518

VIRUS, SARCOMA (Contd.)
- Rous (chicken) (Contd.)
  - tumor induction, duckling: 1540
    - quail: 1541

VITAMINS
- vitamin A palmitate, epithelial atypia, hamster cheek pouch: 1450
- α-tocopherol (vitamin E), effect on benzpyrene sarcoma, mouse: 1447

WATER POLLUTION
- benzanthracene, analysis, method: 1398

ZINC
- binding, mechanism, prostate cancer or hyperplasia: 1647

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF H.E.W.

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

616.99405
CAR

Vet Med

AUGUST 1969
Abstract Nos. 1653-1988

Vol. 7
No. 8

OCT 2 69

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

CARCINOGENESIS ABSTRACTS

Volume 7, Number 8
August, 1969

(Submitted for Publication
May, 1969)

Abstract Numbers
1653-1988

CONTENTS

	Page
Review	333
Physical Carcinogenesis	337
Chemical Carcinogenesis	340
Viral Carcinogenesis	352
Epidemiology and Biometry	370
Miscellaneous	381
Author Index	i
Subject Index	v
Erratum	xvi

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a national program of cooperative research in cancer, is establishing a means whereby information in the field of carcinogenesis will be coordinated and made available. The information to be included will be obtained from the National Cancer Institute, other governmental agencies, and non-governmental research institutions.

The issuing of *Carcinogenesis Abstracts* under the auspices of the National Cancer Institute will provide a central source for current abstracting of the carcinogenesis literature being published throughout the world. This will help facilitate an integrated and cooperative program of investigation in this area. The growing number of publications in the area of carcinogenesis makes imperative the availability of an appropriate abstracting service so that investigators may be apprised of progress with a minimum of delay. It is our desire to provide the investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most recently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. If the journal is not covered by *Index Medicus*, then the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

admin.	administered, administration	mg	milligram(s)
av.	average	min.	minute(s)
C	curie(s)	ml	milliliter(s)
mC	millicurie(s)	mm	millimeter(s)
µC	microcurie(s)	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
conc.	concentration	NIH	National Institutes of Health, USA
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	QO_2	oxygen quotient
DNase	deoxyribonuclease	PFU	plaque forming unit
e.g.	for example	ppm	parts per million
FFU	focus forming unit	pt.(s)	patient(s)
g.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
g	gram(s)	RES	reticuloendothelial system
µg	microgram(s)	resp.	respectively
Hb	hemoglobin	RNA	ribonucleic acid
i.a.	intra-arterial	RNase	ribonuclease
ID_{50}	median infectious dose	soln.	solution
inj.	injected, injection(s)	s.c.	subcutaneous
inoc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
i.p.	intraperitoneal	x	times (e.g. x 3/wk.)
I.U.	international unit(s)	U	unit
i.v.	intravenous	UV	ultraviolet
kg	kilogram(s)	vol.	volume
LD_{50}	median lethal dose	VA	Veterans Administration
M	molar, mole(s)	wt.	weight
mM	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
µM	micromole(s)		
max.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

Af.	Afrikaans	E.	English	Hun.	Hungarian	Lith	Lithuanian	Ser.	Serbo-Croatian
Ar.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
Bul.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
Ch.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
Cz.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
Dan.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
Dut.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

69-1653 UTILITY AND FAILURE OF MODELS IN ONCOLOGY. (E.) Huseby, R. A. (Amer. Med. Ctr., Denver, Colo.). Fed. Proc. 28(1): 211-215, 1969. (32 references)

The relationships between experimental and human tumors are discussed, with particular reference to the similarities and differences between human breast cancer and mammary tumors of mice and rats.

69-1654 RADIATION AS A CARCINOGEN. (E.) Warren, S. (New Eng. Deaconess Hosp., Boston, Mass.). Laeknabladid 54(5):211-227, 1968. (22 references)

Much of the paper is devoted to a discussion of radiation leukemogenesis in Hiroshima and Nagasaki, men treated with radiotherapy for ankylosing spondylitis, radiologists, and pts. treated with ^{32}P for polycythemia vera (but the leukemia incidence is apparently not excessive in women admin. radiotherapy for cervix cancer). Other radiation-induced human tumors discussed include skin cancer (radiologists), lung cancer (uranium miners), thyroid cancer (Hiroshima and Nagasaki, and persons admin. thymic irradiation in childhood), carcinoma of the accessory sinus epithelium (caused by accumulation of radon in these tissues), and osteogenic sarcoma (especially in the radium watch dial painters).

69-1655 DEFECTIVE ONCOGENIC VIRUSES. (Rus.) Shevliagin, V. Ia. (Inst. Epidem. Microbiol., Acad. Med. Sci. USSR, Moscow). Vop. Virus 13(5):542-548, 1968. (50 references)

The infectivity and tumor-inducing properties of several defective strains of Rous or Moloney sarcoma viruses and adenovirus-SV40 hybrids are discussed.

69-1656 SATELLITE VIRUSES, HELPER VIRUSES, AND SYNERGISTIC ACTION. (E.) Rapp, F. (Baylor U. Sch. Med., Houston, Tex.). Nat. Cancer Inst. Monogr. 29:405-419, 1968. (65 references)

The 3 mechanisms by which virus production in mixedly infected cells can be enhanced by the presence of another virus are discussed: the satellite system (poliovirus + SV40; tobacco necrosis virus + adenovirus); the helper virus system (Rous-associated + Rous sarcoma viruses; Moloney sarcoma + mouse leukemia viruses; SV40 or simian adenoviruses + human adenoviruses); and the synergistic system (human adenoviruses + defective SV40 genetic material).

69-1657 VETERINARY VACCINES. (E.) LaSalle, B. (Agric. Res. Serv., Hyattsville, Md.). Nat. Cancer Inst. Monogr. 29:515-522, 1968. (8 references)

The transmission of tumor viruses by veterinary cell culture vaccines is discussed. No field observations of tumor induction by such vaccines have been reported in the U.S., but it is suggested that the extensive losses of poultry from avian leukosis might be associated with the extensive use of poultry vaccines.

69-1658 VIRAL CARCINOGENESIS. (Ger.) Nielsen, G. (Bernhard Nocht Inst. Naval Trop. Med., Hamburg, Germany). Med. Welt 36(49): 2693-2699, 1968. (51 references)

The properties of oncogenic viruses containing DNA (polyoma, papilloma, SV40, pox and adenoviruses) and RNA (avian and mouse leukemia and sarcoma viruses, mouse mammary tumor virus) are compared.

69-1659 BIOCHEMICAL CHANGES IN CHROMOSOMAL ABNORMALITIES. (E.) Hsia, David Yi-Yung (Northwestern U. Sch. Med., Chicago, Ill.), H. L. Nadler and Ling-yu Shih. Ann. N.Y. Acad. Sci. 155(3):716-736, 1968.

Available evidence concerning the enzymatic changes associated with chromosomal abnormalities, including Philadelphia (Ph^1) chromosome-positive chronic granulocytic leukemia (CGL) is discussed. It is concluded that the changes in leukocyte alkaline phosphatase activity seen in Ph^1-positive CGL and in other types of chromosomal abnormalities (Down's, Klinefelter's or trisomy-18 syndromes) are non-specific in nature. (46 references)

69-1660 THE PRESENT STATUS OF PSYCHOSOMATIC CANCER RESEARCH. (E.) Kissen, D. M. (South. Gen. Hosp., Glasgow, Scotland). Geriatrics 24(1):129-137, 1969. (39 references)

Studies of the personality patterns of cancer pts. (usually men with lung cancer and women with breast or genital cancer) show a significant pattern of emotional inhibition and repression ("poor outlet for emotional discharge," sometimes extraversion with a low tendency to neuroticism) and depressive reactions to adverse life situations (especially the loss of a strong relationship, such as widowhood or divorce) in cancer pts. Neuroendocrine factors influencing this pattern are discussed, particularly the interrelationships between the hypothalamus (which controls such emotions as rage, and is in turn controlled by higher centers such as the forebrain), the pituitary and the adrenals.

69-1661 CANCER EPIDEMIOLOGY IN TROPICAL AFRICA. (E.) Burkitt, D. P. Brit. J. Hosp. Med. 1(2):214-218, 1968. (24 references)

Factors possibly influencing the geographical variations in the relative incidences of several tumors in tropical Africa are discussed. The relative incidences of Kaposi's sarcoma and cancer of the stomach and nasopharynx are high in certain areas of high altitude. Cancer of the esophagus may be related to the consumption of distilled alcoholic beverages, and hepatoma to the consumption of aflatoxin-contaminated peanuts and peanut products. The incidence of cancer of the penis is low in areas where circumcision is widely practiced. The possible relationships of climate, insect vectors and malaria to the Burkitt lymphoma are also mentioned.

69-1662 EXPERIMENTAL AND CLINICAL ASPECTS OF THE CARCINOGENIC POTENTIAL OF STEROID CONTRACEPTIVES. (E.) Hertz, R. (Natl. Inst. Child Health Human Devel., Bethesda, Md.). Int. J. Fertil. 13(4):273-286, 1968. (72 references)

Steroid contraceptives have been implicated in cancer of the breast, cervix and endometrium when age, parity and length of exposure are considered. However, a study of changes in the incidence of cancer of the breast or cervix in women of the 20-39 age group would require a sample of 15,000-20,000 women for a 4-yr. follow-up study, to detect an undelayed 2-fold increase in risk at the 95% confidence level. Changes in the incidence of cancer of the endometrium would require a study group 6-8 times this size. In view of the known mammary carcinogenic effects of contraceptive hormones in animals, the author recommends the use of other long-term contraceptive methods for healthy young women, until more experimental and clinical experience is available.

69-1663 PATHOGENESIS OF CELLULAR NECROSIS IN RESPONSE TO CHEMICAL INSULT. (E.) Judah, J. D. (Chicago Med. Sch., Ill.). New Zeal. Med. J. 67(427):73-79, 1968. (24 references)

Since the ultrastructural and biochemical changes induced in the liver by a variety of hepatotoxins (carcinogenic or otherwise) are common to many or all of these chemicals, it is suggested that on the subcellular level, this liver damage is analogous to the inflammatory reaction. The relationship, if any, between necrosis and carcinogenesis in the liver is obscure.

69-1664 THE POSSIBLE SIGNIFICANCE OF ALKYLATION IN CARCINOGENESIS. (E.) Magee, P. N. (Med. Res. Coun. Lab., Carshalton, England). New Zeal. Med. J. 67(427):59-72, 1968. (39 references)

It is suggested that alkylation of guanine by a nitrosamine compound results in the formation of an abnormal guanine-thymine pair, and that mutation results either from a wrong sequence in the base chain or splitting out of the alkylated base from DNA. In the latter case, the lesions developing in the target organs of animals treated with nitrosamines would resemble mutation by deletion. RNA and/or protein reactions may also be significantly involved in nitrosamine carcinogenesis.

69-1665 ENDOCRINE FACTORS AS DETERMINANTS OF THE SUSCEPTIBILITY OF THE LIVER TO CARCINOGENIC AGENTS. (E.) Goodall, C. M. (U. Otago, Dunedin, New Zealand). New Zeal. Med. J. 67(427):32-43, 1968. (37 references)

The complete inhibition of fluorenylamine, azo dye and aflatoxin carcinogenesis in the liver (but not in other tissues), in totally hypophysectomized (hypox.), thyroidectomized or adrenalectomized rats, may result from an inhibition of the initiation stage of carcinogenesis (as opposed to the tumor growth stage). It is suggested that liver carcinogens can be classified into 2 groups, according to their effectiveness in hypox. rats.

69-1666 CARCINOGENESIS AND GENE ACTION. (E.) Gelboin, H. V. (NCI, Bethesda, Md.). New Zeal. Med. J. 67(427):111-126, 1968. (53 references)

It is suggested that carcinogens induce the formation of an altered phenotype in susceptible cells by changing the patterns of messenger RNA (mRNA) synthesis, and that this new phenotype may become heritable if the altered mRNA-synthetic patterns are "locked" into the cell information transfer system by a cycle of DNA synthesis.

69-1667 BLOOD DYSCRASIS AND LEUKEMIA ASSOCIATED WITH CHLORAMPHENICOL. (E.) Atlee, J. L., III (Temple U. Hosp., Philadelphia, Pa.). J. Germantown Hosp. 9(2):84-89, 1968. (14 references)

The delayed, often irreversible bone marrow aplasia seen in some pts. treated with chloramphenicol may result from the presence of a genetically determined biochemical abnormality (similar to glucose-6-phosphate dehydrogenase deficiency) involving the DNA and RNA synthetic pathways in persons susceptible to bone marrow aplasia. It is suggested that leukemia may be a complication of chloramphenicol-induced bone marrow aplasia.

69-1668 ASBESTOSIS AND NEOPLASIA. (E.) Kleinfeld, M. J. (New York U. Med. Ctr., N. Y.). Med. Times 96(12):1223-1229, 1968. (9 references)

The increased risk of lung, pleural, g.i. and peritoneal tumors in asbestos workers, especially those who smoke, is discussed.

69-1669 NICKEL CARCINOGENESIS. (E.) Sunderman, F. W., Jr. (U. Connecticut Sch. Med., Hartford). Dis. Chest 54(6):527-534, 1968. (91 references)

Subjects discussed include the epidemiology of respiratory cancer in nickel workers; nickel carcinogenesis in animals (the carcinogenic effects of nickel preparations are inversely correlated to their solubilities); the possible role of nickel as a carcinogen in tobacco smoke or asbestos; and the biochemical effects of nickel (inhibition of DNA-dependent RNA synthesis).

69-1670 VIRUSES IN THE AETIOLOGY OF CANCER. (E.) Harris, R. J. C. (Imp. Cancer Res. Fund, London). Iq. Mod. 61(3-4):123-128, 1968. (No references)

Viral tumor induction in animals and (presumably) man is reviewed.

69-1671 HEPATITIS AND LEUKEMIA: THEIR RELATION TO AUSTRALIA ANTIGEN. (E.) Blumberg, B. S. (Inst. Cancer Res., Philadelphia, Pa.), A. I. Sutnick and W. T. London. Bull. N.Y. Acad. Med. 44(12):1566-1586, 1968. (33 references)

The association of the "Australia antigen" (Au) with certain forms of leukemia (acute myeloid or lymphatic and chronic lymphatic, but not chronic myeloid), infectious hepatitis (especially in the acute stages), Down's syndrome and lepromatous leprosy is discussed. Two hypotheses are presented: 1), that some pts. with these diseases show a deficiency of the immune mechanism (possibly inherited in some populations) which can result in a chronic infection with a "carrier virus" associated with Au; or 2), that Au is an infectious agent (possibly a virus) that induces hepatitis in some persons and certain forms of leukemia in other persons.

69-1672 A SUBCELLULAR AGENT INDUCING PLASMA CELL LEUKEMIAS IN MICE. THE RELATION OF THIS AGENT TO AMYLOIDOSIS AND CHRONIC MURINE PNEUMONIA. (E.) Ebbesen, P. (U. Copenhagen, Denmark). Acta Path. Microbiol. Scand. Supp. 197:10-59, 1968. (207 references)

Evidence is presented to suggest that the subcellular material (perhaps a virus) from plasma cell leukemias of (CBA x DBA/2)F_1 mice, which induces leukemia in female BALB/c mice, is at least similar to the agent inducing amyloidosis in male BALB/c mice. The leukemogenic and amyloidosis-inducing agent(s) apparently had no connection with the agent (perhaps a large virus or a Mycoplasma) inducing chronic pneumonia in BALB/c mice.

69-1673 ETIOPATHOGENESIS AND CURE OF THE GROSS VIRUS LEUKEMIA IN MICE. (It.) Zironi, A. (U. Milan, Italy). Haematologia 53(5):377-393, 1968. (20 references)

Host immunity in mice inoc. with Gross leukemia virus is discussed, with particular reference to age differences in susceptibility to the virus.

69-1674 THE MODE OF FORMATION OF INTRACYTOPLASMIC STRUCTURES IN TUMOURS INDUCED BY VIRUSES OF THE AVIAN SARCOMA LEUCOSIS GROUP. (E.) Landschütz, Chr. (Max Planck Inst. Immunobiol., Freiburg, Germany). Experientia 24(12):1255-1256, 1968. (12 references)

Evidence is presented to suggest that these intracytoplasmic aggregates (containing ribosome-like and virus nucleoid-like particles) are antigen-antibody precipitates of the living host cells.

69-1675 PHENOTYPIC EXPRESSION AND CELL MARKER SYSTEMS. (E.) Harris, M. (U. California, Berkeley). Nat. Cancer Inst. Monogr. 1-7, 1968. (37 references)

69-1676 VIRAL FLORA OF CHICK AND DUCK TISSUE SOURCES. (E.) Luginbuhl, R. E. (U. Connecticut, Storrs). Nat. Cancer Inst. Monogr. 29:109-118, 1968. (119 references)

69-1677 VIRAL FLORA OF CHICK AND DUCK TISSUE SOURCES - DISCUSSION. (E.) Witter, R. L. Nat. Cancer Inst. Monogr. 29:119-121, 1968.

69-1678 VIRUSES INFECTING CATTLE AND THEIR ROLE AS ENDOGENOUS CONTAMINANTS OF CELL CULTURES. (E.) Kniazeff, A. J. (U. California, Oakland). Nat. Cancer Inst. Monogr. 29:123-132, 1968. (65 references)

69-1679 VIRAL FLORA OF CANINE TISSUES. (E.) Gillespie, J. H. (Cornell U., Ithaca, N.Y.). Nat. Cancer Inst. Monogr. 29:133-139, 1968. (25 references)

69-1680 VIRAL FLORA OF RABBITS. (E.) Wilner, B. I. (Cutter Lab., Berkeley, Calif.). Nat. Cancer Inst. Monogr. 29:141-148, 1968. (11 references)

69-1681 VIRAL FLORA OF TISSUE SOURCES - SIMIAN AND HUMAN. (E.) Kalter, S. S. (Southwest Found. Res. Ed., San Antonio, Tex.) and R. L. Heberling. Nat. Cancer Inst. Monogr. 29:149-160, 1968. (47 references)

69-1682 EVIDENCE FOR ONCOGENIC PROPERTIES OF PRIMARY CULTURES. (E.) Defendi, V. (Wistar Inst. Anat. Biol., Philadelphia, Pa.). Nat. Cancer Inst. Monogr. 29:269-270, 1968.

69-1683 EVIDENCE FOR ONCOGENIC PROPERTIES OF HETEROPLOID CELL LINES. (E.) Sanford, K. K. (NCI, Bethesda, Md.). Nat. Cancer Inst. Monogr. 29:283-287, 1968. (23 references)

69-1684 EVIDENCE FOR ONCOGENIC PROPERTIES OF HETEROPLOID CELL LINES - DISCUSSION. (E.) Barski, G. (Inst. Gustave-Roussy, Villejuif/Seine, France). Nat. Cancer Inst. Monogr. 29:289-290, 1968.

69-1685 EVIDENCE FOR ONCOGENIC PROPERTIES OF HETEROPLOID CELL LINES - DISCUSSION. (E.) Moore, A. E. (Sloan-Kettering Inst. Cancer Res., New York, N.Y.). Nat. Cancer Inst. Monogr. 29:291-294, 1968.

69-1686 DETECTION OF LATENT VIRUSES. (E.) Rightsel, W. A. (U. Tennessee Med. Units, Memphis). Nat. Cancer Inst. Monogr. 29:359-363, 1968. (8 references)

69-1687 MONITORING VACCINES FOR HUMAN ONCOGENICITY. (E.) Miller, R. W. (NCI, Bethesda, Md.). Nat. Cancer Inst. Monogr. 29:453-455, 1968. (4 references)

69-1688 MONITORING VACCINES FOR HUMAN ONCOGENICITY - DISCUSSION. (E.) Robbins, F. C. (Case Western Reserve U. Sch. Med., Cleveland, Ohio). Nat. Cancer Inst. Monogr. 29:457-461, 1968.

69-1689 COOPERATIVE AND ANTAGONISTIC INTERACTIONS AMONG RNA TUMOR VIRUSES. (E.) Vogt, P. K. (U. Washington Sch. Med., Seattle). Nat. Cancer Inst. Monogr. 29:421-426, 1968. (36 references)

69-1690 SATELLITE VIRUSES, HELPER VIRUSES, AND SYNERGISTIC ACTION - DISCUSSION. (E.) Smith, K. O. (Div. Biol. Stan., Bethesda, Md.). Nat. Cancer Inst. Monogr. 29:427-431, 1968. (12 references)

69-1691 PROBLEMS OF THE INTERACTION BETWEEN CARCINOGENIC AND ANTICANCER AGENTS AND NUCLEIC ACIDS. I. THE INTERACTION BETWEEN CARCINOGENIC AGENTS AND NUCLEIC ACIDS. (Rum.) Niculescu-Duvăz, I. (Oncol. Inst., Bucharest) and N. Voiculet. Oncol. Radiol. 7(3):193-204, 1968. (119 references)

69-1692 TUMOR IMMUNOLOGY. (Fin.) Mäkelä, O. (Sero-Bacteriol Inst., Helsinki). Duodecim 85(3):172-177, 1969. (13 references)

69-1693 CYTOLOGICAL ASPECTS OF TUMOR FORMATION. (Jap.) Tanaka, T. (Inst. Cancer Res., Aichi, Japan). Saishin Igaku 23(3):454-463, 1968. (69 references)

69-1694 EPIDEMIOLOGY OF THYROID CANCER. (Jap.) Ito, K. (Ito Hosp., Shibuya, Japan). Nippon Rinsho (Jap. J. Clin. Med.) 26(8):1812-1817, 1968. (29 references)

69-1695 EFFECT OF HORMONES ON THE INDUCTION AND DEVELOPMENT OF CANCER. (Jap.) Yokoro, K. (U. Hiroshima, Japan), S. Takizawa and A. Ito. Saishin Igaku 23(3):503-512, 1968. (75 references)

See also abstract nos.: 1743,1940,1975,1981

9-1696 TUMORIGENICITY OF SMALL HIGHLY RADIOACTIVE PARTICLES. (E.) Dean, P. N. Los Alamos Sci. Lab., New Mex.) and W. H. angham. Health Phys. 16(1):79-84, 1969.

mathematical model of the probability of tumor nduction by small radioactive particles (emitting β, α and X-rays) in the skin and lung is resented, using data from experiments on rat kin as a model. This method is used to calculate he probability that each cell exposed will orm a tumor, and to sum for all cells exposed o obtain the tumor probability.

9-1697 AN EPIDEMIOLOGICAL STUDY ON LEUKEMIA IN SURVIVORS EXPOSED TO THE ATOMIC OMB IN CHILDHOOD IN HIROSHIMA (PART I). (E.) himizu, K. (Hiroshima U., Japan). Hiroshima J. ed. Sci. 17(3):123-129, 1968.

n the 291 radiation-exposed Hiroshima and agasaki residents who died with leukemia from 946-1967, the male:female ratio was 1.14:1. his ratio varied according to the age at xposure: 0.72:1 at age 0-4 yr. (31/291), .91:1 at age 5-9 yr. (21/291), 2.71:1 at age 0-14 yr. (26/291), and 1.13:1 at age 15 and ver (213/291). Of the leukemia pts. exposed uring childhood (age 0-14 yr.), 67/78 (85.9%) ad been exposed within 2499 m of the hypocenter, 5/67 of these (67.2%) within 1499 m. The nnual leukemia incidence/100,000 population calculated from the 1955 census data) in ersons exposed as children (0-14 yr.) or as dults (15 yr. and over) was highest at the ighest radiation dosages (calculated according o the distances from the hypocenter). In hildren and adults exposed at 999 m or less, he leukemia incidence was 314.15 and 185.27, esp., in males, and 189.39 and 118.16, resp., n females. In children and adults exposed at 000-1499 m, the incidence was 48.20 and 36.24, esp., in males, and 52.90 and 26.70, resp., in emales. The leukemia incidence in exposed dults was higher in males than in females at ll radiation doses. In exposed children, the ncidence was higher in males than in females nly at the highest dose (within 999 m from the ypocenter); at all lower doses, the incidence as higher in females than in males. In persons xposed as children, the relative incidence of cute myeloid leukemia decreased, and the elative incidence of chronic myeloid leukemia ncreased, as the age at exposure increased.

9-1698 CHRONIC LYMPHOCYTIC LEUKEMIA IN HIROSHIMA AND NAGASAKI, JAPAN. (E.) inch, S. C. (Yale U. Sch. Med., New Haven, onn.), T. Hoshino, T. Itoga, M. Ichimaru and . H. Ingram, Jr. Blood 33(1):79-86, 1969.

he Leukemia Detection Program records for 1946-965 (inclusive) revealed 487 cases of leukemia from the Hiroshima referral area (233 from the city itself; av. population 442,000 during this 20-yr. period), and 364 cases from the Nagasaki referral area (170 from the city itself; av. population 367,000). Chronic lymphocytic leukemia (CLL) was found in 2/487 (0.4%) from the Hiroshima referral area; however, since no cases of CLL were found in Hiroshima itself, the CLL incidence rate in this city could not be calculated. CLL was found in 11/364 (3.0%) from the Nagasaki referral area, including 6/170 (3.5%) from the city itself. This discrepancy between the 2 referral areas was described as "no more than suggestive." The CLL incidence in the city of Nagasaki (0.88/million/yr.) was comparable to the CLL incidence in all of Japan (about 0.8/million/yr., or 2.6% of all leukemias, in 1956-1961); by comparison, the CLL incidence in the U.S. is about 15/million/yr. (20-30% of all leukemias). The 13 CLL pts. were adults (5 men, 8 women; av. age, 52 yr. at onset); 5/13 had been exposed to the atomic explosion (within the Nagasaki city limits), but none had been closer than 3000 m to the hypocenter; therefore, they had received radiation doses estimated at less than 1 rad.

69-1699 A STUDY ON THE INCIDENCE OF LEUKEMIA DEVELOPING AFTER THERAPEUTIC IRRADIATION FOR CANCER OF BREAST AND UTERUS. (Jap.) Mayeda, K. (Fac. Med., U. Tokyo), S. Yamamoto, H. Miyata and H. Enomoto. Nippon Igaku Hoshasen Gakkai Zasshi (Nippon Acta Radiol.) 28(8): 1122-1133, 1968.

Following radiotherapy (RT) for cancer of the breast (7) or uterus (9), 16 women developed chronic myeloid leukemia (3/16) or acute leukemia (13/16; myeloid in 8/13, monocytic in 3/13, erythroleukemia in 2/13). The RT doses varied widely (2316-17,820 r/course); no clear relationship between the RT dosage and the latent periods for leukemia development was evident. In 12 pts. receiving single courses of RT (including 2 pts. treated simultaneously with X-rays and radium), the latent periods were 1-3 yr. in 7/12 and 5.5-8 yr. in 5/12 (including 2/3 with chronic myeloid leukemia). The other 4 pts. received 2 courses of RT at intervals of 10 mo. (1/4), 5-7 yr. (2/4) or 15 yr. (1/4); leukemia developed in these pts. 6 mo.-1 yr. (2/4) or 3 yr. (2/4) after the last dose of RT. Mathematical models for calculating the incidence of leukemia (expected to follow a Poisson distribution curve) in pts. receiving RT for cancer of the breast and uterus are present. At the time of report, the number of cases with adequate follow-up times was not yet large enough to calculate this incidence rate with an 0.95 probability.

69-1700 POST-IRRADIATION LEUKEMIA IN THE COURSE OF MAMMARY CANCER. (Pol.)

Obrzut, D. (Acad. Med., Bialystok, Poland) and B. Kiersnowska. Przegl. Lek. 24(8):649-650, 1968.

Pronounced radiation dermatitis over the left breast and chronic myeloid leukemia developed in a 53-yr.-old woman, 5 yr. after X-ray therapy (total dose 20,865 r over 33 days) for carcinoma of the left breast. No neoplastic metastases were found.

69-1701 MENINGIOMA DEVELOPMENT INDUCED BY A FOREIGN BODY. (Ger.) Schulze, A. (Free U., Berlin) and B. Bingas. Beitr. Neurochir. (15):297-301, 1968.

An ependymoma of the left fronto-parietal-parasagittal lobe was removed from an 11-yr.-old girl. During a second operation 2 yr. later for a recurrence of the tumor in the same area, a meningioma surrounding a silver clip (left there during the first operation) was also found and removed. Two more operations for recurrences of the ependymoma were performed during the next 3 yr. The development of the meningioma was attributed to the intracranial foreign body (acting as a chronic exogenous stimulus). Hormonal changes during puberty apparently affected the growth rate of the ependymoma.

69-1702 SCARS AND CICATRIZATION IN BRONCHIAL CARCINOMAS. (Ger.) Haupt, R. (Path.-Bacteriol. Inst., Leipzig, Germany) and H. Kühn. Z. Krebsforsch. 71(4):301-307, 1968.

Examination of 225 autopsy specimens of lung carcinoma disclosed various types of lung scarring and/or cicatrization in 72 cases (32.0%). Scarring and cicatrization were more frequently associated with well-differentiated tumors (60.0% of 15 adenocarcinomas, 31.4% of 15 nonkeratinized and 36.1% of 36 keratinized squamous cell carcinomas) than with undifferentiated carcinomas (28.6% of 95 small cell carcinomas, 25.0% of 32 polymorphocellular carcinomas). Old scars, usually of tuberculosis, were present in 49 specimens (21.8%), simple cicatrization in 23 specimens (10.2%), and both old scars and cicatrization in 39 specimens (17.3%). Scar tissue was macroscopically visible in 21 specimens (9.3%), but only 7 tumors (3.1%) were closely associated with the scar tissues. Problems of the differentiation of tumors with cicatrization, pre-existing scars overgrown by tumor tissue, and genuine scar cancers are discussed.

69-1703 SOLAR ULTRAVIOLET RADIATION IN RELATION TO SUNBURN AND SKIN CANCER. (E.) Robertson, D. F. (U. Queensland, Brisbane, Australia). Med. J. Aust. 2(25):1123-1132, 1968.

The burning and carcinogenic effects of sunlight depend on the level of UV-B wavelengths (280-320 mμ) present; UV-C (below 280 mμ), also potentially dangerous, is produced by artificial radiation sources and is found outside the earth's atmosphere. The "relative burning effectiveness" of sunlight varies according to latitude, season, time of day, and other factors such as altitude and cloud cover. At latitudes beyond which skin cancer is rare (Toronto, Ontario and Christchurch, New Zealand), the relative burning effectiveness of the noonday sun in midsummer is about the same as the relative burning effectiveness of noonday sunlight at its minimum ("winter") value on the Equator. At Melbourne, Brisbane and Townsville, and in the New Guinea highlands, this minimum value is exceeded during 3, 5, 6 and 10 mo./yr., resp. The development of skin cancer apparently depends partly on long-term exposure, partly on short-term peaks, and also on the extent to which exposure to sunburning levels of sunlight is maintained continuously throughout the yr. Electrical discharges from some sources (such as UV lamps and welding arcs) also contain significant amounts of UV-B and UV-C. Protective measures are discussed, with particular reference to sunscreen preparations.

69-1704 A COMPARATIVE STUDY OF THE LEUKEMOGENIC EFFECTS OF STRONTIUM-90 AND X-RAYS IN MICE. (E.) Ito, T. (Hiroshima U., Japan), K. Yokoro, A. Ito and E. Nishihara. Proc. Soc. Exp. Biol. Med. 130(1):345-350, 1969.

The leukemogenic effects of ^{90}Sr (1.0 μC/g i.p.; at age 5 wk.), local X-irradiation (1000 r; at age 4 wk.) and fractionated total-body X-irradiation (total dose 680 r; beginning at age 4 wk.) were studied in female ICR/JCL mice. The leukemia incidence was studied up to age 630 days. No leukemias developed in untreated controls (up to 360 days old). Total-body X-irradiation induced leukemia in 77.3%, while ^{90}Sr induced leukemia in 61.8%. Thymectomy (at age 3 wk.) reduced leukemogenesis by total-body X-irradiation (to 20.8%), but did not inhibit ^{90}Sr leukemogenesis (67.6%). Local X-irradiation induced leukemia in 37.5%; local X-irradiation + ^{90}Sr induced leukemia in 75.0%. Osteogenic sarcomas developed in 16/84 mice treated with ^{90}Sr (including 2/56 with leukemia). All but 1 of the leukemias induced by total-body X-irradiation were of thymic origin, but the ^{90}Sr-induced leukemias were not of thymic origin. No myeloid leukemias were noted. Since 3 of the ^{90}Sr-induced leukemias and 1 of the X-ray-induced leukemias could be transmitted by presumably cell-free extracts to newborn ICR/JCL and ddN/JCL mice, it is suggested that a viral factor may be involved in ^{90}Sr leukemogenesis as well as X-ray leukemogenesis.

69-1705 THE EFFECTS OF RADIATION AND ETHIONINE ON RAT MAMMARY TUMOR INCIDENCE. (E.) Telles, N. C. (U.S. Dept. HEW, Washington, D.C.)

d B. C. Ward. Radiat. Res. 37(3):577-589,
969.

emale Osborne-Mendel rats (3.5 mo. old) were
ed diets containing up to 0.16% of DL-ethionine
) for 5.5 mo. After 2 wk. of E feeding, some
ats received a single dose of X-rays (175 rads),
ther as whole-body radiation (WBR) or as liver
diation (LR). During the 18-mo. study, 85/279
ats died, 43/85 (50.6%) of mammary tumors
7/45 died of mammary tumors after 11.5-18 mo.
observation). Mammary tumors developed in a
tal of 103/279 rats. The incidence of mammary
mors in control and LR-treated rats was
affected or slightly reduced by E admin. The
mmary tumor incidence in the 11.5-mo. survivors
the WBR group was higher than the incidence in
n-irradiated or LR-treated rats, but the
etary level of E did not affect the mammary
mor incidence at this time. In the 18-mo.
rvivors of the WBR group, however, the mammary
mor incidence was highest in the rats fed the
ghest dietary levels of E. The results
ggested that E had a synergistic or
carcinogenic effect in WBR-treated rats, but
at its effects (for some unknown reason) did
t appear until 12-18 mo. after exposure, which
s at least 6 mo. after E feeding was stopped.

-1706 THE ULTRASTRUCTURE OF VIRUS- AND
RADIATION-INDUCED THYMOMAS OF C57Bl
CE. (E.) Lagerlöf, B. (Karolinska Inst.,
ockholm). Acta Path. Microbiol. Scand. 74(4):
5-513, 1968.

ymomas induced in C57Bl/Ka mice by irradiation
an unspecified virus, were ultrastructurally
milar to the lymphoblasts seen in thymic tissue
embryonic mice of the same strain. Some
ymoma cells showed occasional lysosomes (in
is respect, they resembled the epithelial cells
normal adult thymus). The tumor cells and
mphoblasts contained more ribosomes than nor-
al adult thymocytes. Type C virus particles
re seen in 1/8 radiation-induced and 1/6
rus-induced thymomas, but no virus particles
re found in non-leukemic embryonic or adult
ymus lobes.

-1707 DNA CYTOPHOTOMETRY OF RADIATION-IN-
DUCED MOUSE THYMOMA. (E.) Adams,
. R. (Karolinska Hosp., Stockholm) and B.
agerlöf. Acta Cytol. (Balt.) 13(3):122-127,
969.

e DNA content/nucleus of thymomas induced in
57Bl mice by ^{60}Co irradiation (680 rads in 4
qual doses over 4 wk.) was studied cytophoto-
etrically, using the Feulgen-DNA extinction
ethod. DNA levels were uniform and histograms
howed a very sharp diploid peak in thymus cells
rom untreated adult controls. Regenerating
hymus cells from mice not developing tumors
including mice exposed to thigh-shielded
irradiation) showed slightly increased DNA synthesis. In cells from early, localized thymomas (studied 65 or 100 days after the beginning of irradiation), proliferative activity was more marked, but no signs of aneuploidy were present. Disseminated thymomas (studied in the terminal stages of the disease) showed strong proliferative activity. Two of these tumors showed some signs of aneuploidy; a lymph node metastasis from 1 thymoma of low differentiation showed a gross change in ploidy, which was not apparent in the parent thymoma.

69-1708 CHROMOSOME POLYPLOIDIZATION IN HUMAN LEUKOCYTES INDUCED BY RADIATION. (E.) Nasjleti, C. E. (U. Michigan, Ann Arbor) and H. H. Spencer. Ann. N.Y. Acad. Sci. 155(3): 748-758, 1968.

Structural damage to the chromosomes appeared shortly after the beginning of radiotherapy (RT; p.o. ^{131}I in 5 pts., X-rays or ^{60}Co in 7 pts.) in 12 pts. with thyrotoxicosis (4/12) or cancer. Polyploidy, especially tetraploidy, was a constant feature; it persisted throughout RT, but WBC cultures from 4 pts., obtained 3-9 mo. after the end of RT, showed a large percentage of normal metaphases, suggesting that the cells with chromosomal changes (probably transformed lymphocytes) lost much of their proliferative capacities. Examination of 150 tetraploid mitoses from these pts. showed dicentrics in 73% and acentric fragments in 44% (all of the cells with acentric fragments also showed dicentrics), but none of the cells showed rings, tri- or quadriradial forms, or rearrangements. Similar chromosomal changes were seen in irradiated WBC cultures from 5 normal subjects.

69-1709 DEFECTIVE PHOTOCHEMICAL REPAIR IN CANCER-SENSITIZED HUMAN EPITHELIAL CELLS. (E.) Roth, D. (New York U. Med. Ctr., N.Y.) and H. H. Sage. Proc. Amer. Ass. Cancer Res. 10:74, 1969.

69-1710 OCCURRENCE OF TYPE A VIRUS PARTICLES IN A MALIGNANT LYMPHOMA ARISING IN AN X-IRRADIATED SYRIAN HAMSTER. (E.) Stenback, W. A. (Baylor U. Coll. Med., Houston, Tex.), D. B. Ferguson, G. L. Van Hoosier, Jr. and J. J. Trentin. Proc. Amer. Ass. Cancer Res. 10:87, 1969.

69-1711 VASCULAR CHANGES DURING UV RADIATION-INDUCED SKIN CARCINOGENESIS. (E.) Urbach, F. (Temple U. Health Sci. Ctr., Philadelphia, Pa.) and P. D. Forbes. Proc. Amer. Ass. Cancer Res. 10:95, 1969.

69-1712 ORIGIN OF A LARYNGEAL CANCER AT A SITE OF INJURY. (Rus.) Brovko, T. E. (Kiev Otolaryngol. Res. Inst., USSR) and S. G. Voitsekhovskaia. Zh. Ushn. Nos. Gorl. Bolez. 29(1):116-118, 1969.

See also abstract nos.: 1654,1721,1756,1935,1944

69-1713 EFFECT OF CARCINOGENIC NITROSAMINES AND NITROSAMIDES ON THE INCORPORATION OF ^{3}H-THYMIDINE, ^{3}H-URIDINE AND ^{3}H-LEUCINE IN Tetrahymena, L CELLS AND LIVER EXPLANTS. (Ger.) Volm, M. (German Cancer Res. Ctr., Heidelberg, Germany) and R. Suss. Naunyn Schmiedeberg. Arch. Pharm. Exp. Path. 261(4):353-359, 1968.

In cultures of Tetrahymena pyriformis and L cells, addition of carcinogenic nitrosamines (diethylnitrosamine or 1,4-dinitrosopiperazine; final conc. 10^{-2}-10^{-5} M) did not affect DNA, RNA or protein synthesis (measured by the uptake of ^{3}H-labeled thymidine, uridine and leucine, resp.) or respiration. Carcinogenic nitrosamide compounds (1-methyl-1-nitrosourea or N-ethyl-N-nitrosourethan; same conc.), however, inhibited RNA, DNA and protein synthesis (in decreasing order of inhibition) and respiration in both cell types. In rat liver explants (obtained from 1-2-day-old Sprague-Dawley rats), compounds of both series (diethylnitrosamine and methylnitrosourea are used as examples) inhibited DNA synthesis.

69-1714 REACTION OF N-METHYL-N'-NITRO-N-NITROSOGUANIDINE WITH PROTEIN. (E.) Sugimura, T. (Nat. Cancer Ctr. Res. Inst., Tokyo), S. Fujimura, M. Nagao, T. Yokoshima and M. Hasegawa. Biochim. Biophys. Acta 170(2):427-429, 1968.

Results of several experiments in cell-free systems indicated that the guanidine-^{14}C-labeled moiety of N-methyl-N'-nitro-N-nitrosoguanidine (NG) was bound preferentially with protein. After 24 hr. of incubation, 6.30, 4, 3.40, and 2.50 nanomoles of the labeled guanidine moiety of NG were incorporated into 1 mole of histone, globulin, cytochrome C and RNase, resp. In contrast, the ^{14}C-labeled methyl moiety of NG was bound with DNA; this incorporation was about 10% as high as the incorporation of the guanidine moiety into protein.

69-1715 PRESENCE OF 3,4-BENZPYRENE IN ISOLATED WATERS OF THE LAGOON OF CLIPPERTON ATOLL. (Fr.) Niaussat, P. (Nat. Ctr. Sci. Res., Paris 5), J.-P. Ehrhardt and J. Ottenwalder. C.R. Acad. Sci. [D] (Paris) 267(21):1772-1774, 1968.

The isolated Pacific island, Clipperton Atoll (about 1300 km off the coast of Mexico), has a completely enclosed lagoon, without important connections with the open sea; the salinity of the surface water is low, but the deeper waters contain zones of high salinity. Examination of the lagoon waters revealed elevated levels of 3,4-benzpyrene (BP; 3.4-4.0 µg/liter), but no BP was found in surface water from the open sea. Many aerobic and anaerobic bacteria (Alcaligenes, Enterobacter, Citrobacter, Clostridium) and many types of zooplankton and phytoplankton (Gonyaulax diacantha, Glenodinium foliaceum, Gymnodinium, Pyrocystis, Rhizosolenia alata, etc.) were found in the lagoon waters. Many dead mollusks but few living macrofauna were also found in the lagoon. The possibility of biosynthesis of BP by the marine organisms is suggested.

69-1716 ON THE ASSOCIATION BETWEEN LYSOGENY AND CARCINOGENICITY IN NITROQUINOLINES AND RELATED COMPOUNDS. (E.) Epstein, S. S. (Harvard Sch. Med., Boston, Mass.) and I. B. Saporoschetz. Experientia 24(12):1245-1248, 1968.

Phage induction in E. coli C-600 λ by 10 nitroquinolines and 6 related compounds (4 hydroxyaminoquinolines, 2 hydroxyaminopyridines) of known carcinogenic, photodynamic and mutagenic activities was studied. A clear positive association was seen between phage induction and carcinogenicity; 9/10 carcinogens (the exception was 6-nitro-4-hydroxyaminoquinoline-1-oxide) induced phage, whereas 6/6 non-carcinogens did not.

69-1717 THE METABOLISM OF 7,12-DIMETHYLBENZ(A)-ANTHRACENE IN CELL CULTURES. (E.) Diamond, L. (Wistar Inst. Anat. Biol., Philadelphia, Pa.), C. Sardet and G. H. Rothblat. Int. J. Cancer 3(6):838-849, 1968.

In hamster and mouse embryo cell cultures, exposed to tritiated 7,12-dimethylbenzanthracene (DMBA) a large fraction of the DMBA was metabolized to water-soluble derivatives (this process was inhibited by actinomycin D). Small amounts of material chromatographically resembling the monohydroxymethyl (but not the dihydroxymethyl) derivatives of DMBA were also recovered. DMBA was metabolized to the hydroxymethyl and the water-soluble derivatives to a much lesser extent by a transformed hamster embryo cell line (HE 44) and a human diploid cell strain (WI-38). The amount of DMBA metabolized by HeLa cells (human cervical carcinoma) was intermediate between the values seen in the normal and transformed rodent cells. The main water-soluble derivatives produced in HeLa cells differed from those produced in the rodent cells. DMBA was metabolized to water-soluble derivatives mainly by the cells sensitive to its cytotoxicity (normal rodent cells and HeLa cells) whereas the transformed cells and normal human cells were relatively resistant. The hydroxymethyl derivatives of DMBA were 100 times less cytotoxic than DMBA in normal rodent cells. A partially purified preparation of the main water-soluble derivative formed in rodent cells, when added to fresh cell cultures, was taken up by these cells at a much slower rate than DMBA itself.

-1718 CARCINOGEN-MEDIATED ALTERATION OF THE RATES OF ENZYME SYNTHESIS AND DEGRADA- ION. (E.) Rechcigl, M., Jr. (NIH, Bethesda, d.) and G. L. Laqueur. Enzym. Biol. Clin. Basel) 9(4):276-286, 1968.

ddition of cycasin (C; 200 mg%) to the stock eed of male Osborne-Mendel albino rats caused a eduction in liver catalase activity. After the dmin. of 3-amino-1,2,4-triazole (1 g/kg i.p.), epatic catalase synthesis was about 1.2 U/hr. in -fed rats, compared to 5.0 U/hr. in pair-fed ontrols. The rates of destruction, which were rst order with respect to the catalase present, ere lower in C-fed rats (1.4%/hr.) than in con- rols (2.9%/hr.). C feeding had no effect on enal catalase levels, which were normally -33% of the hepatic levels. Renal catalase nthesis was less than 1 U/hr. in C-fed rats and 6 U/hr. in controls; the rates of destruction ere 1.8% and 3.3%, resp.

-1719 THE EFFECT OF LSD-25 ON THE CHROMOSOMES OF CHILDREN EXPOSED IN UTERO. (E.) hen, M. M. (State U. New York, Buffalo Sch. d.), K. Hirschhorn, S. Verbo, W. A. Frosch and M. Groeschel. Pediat. Res. 2(6):486-492, 68.

romosome morphology was examined in WBC cul- res from 15 control subjects, 13 children whose thers had taken LSD, the 11 mothers of these children, and 6 other adult LSD users; 16/17 ult LSD users admitted taking other drugs mphetamines, barbiturates, cocaine, hallucinogens, rijuana, opiates and/or phenothiazines, ually in combination). Chromosome breaks were und in 0.0-2.4% (mean 1.2%) of the WBC from e control subjects, and in 0.0-20.3% (mean 23%) of the WBC from LSD-exposed persons; this fference was statistically significant. In 6 ntrol children, chromosome breaks were noted 0.0-2.0% (mean 1.0%) of the WBC, compared to 0-19.0% (mean 9.22%) of the WBC from 9 children ose mothers had taken LSD during pregnancy /9 children had also been exposed to other ugs in utero), and 2.0-8.7% (mean 4%) of the C from 4 children whose mothers had taken LSD fore conception but reportedly not during egnancy. The difference between LSD-exposed d control children was significant. WBC ob- ined from 3 adults and 4 children of the LSD- posed groups showed chromosomal arrangements (6 dicentric chromosomes, 2 adriradial formations); none of the controls owed such rearrangements. The chromosomal normalities could not be related to the dose LSD or the duration of exposure. All subjects re clinically healthy; the children showed no vious birth defects. Long-term implications the presence of chromosomal abnormalities ncluding the risks of malignant tumors, pecially leukemia) are discussed.

69-1720 ULTRASTRUCTURAL ABNORMALITIES IN THE DESCENDANTS OF ALGAE TREATED WITH ACROLEIN. (Fr.) Le Baron-Marano, F. (Plant Cell Biol. Lab., High. Norm. Sch., 24 Lhomond St., Paris) and C. Izard. C.R. Acad. Sci. [D] (Paris) 267(25):2137-2139, 1968.

In several mutant clones of Dunaliella bioculata, descended from algae exposed to acrolein (the most toxic of the components of the gas phase of cigarette smoke in these organisms), electron microscopic examination showed large cytoplasmic inclusion bodies in the nucleus, and other important changes in the cytoplasm (including the Golgi apparatus). The intranuclear inclusions, possibly the result of abnormal proliferation of the nuclear membrane, resembled those seen in cells from certain animal tumors (especially radiation-induced tumors).

69-1721 PARTICLE ACCUMULATION IN THE LUNG AS A POSSIBLE FACTOR IN THE AETIOLOGY OF LUNG CANCER. (E.) Blenkinsopp, W. K. (St. Mary's Hosp. Sch. Med., London). J. Path. Bact. 96(2):297-304, 1968.

The accumulation of inhaled or inj. carbon particles in scarred or unscarred lung tissue was studied in several groups of adult black-hooded or albino Wistar rats. In unscarred lung tissue, inhaled particles were collected chiefly in the alveoli around the respiratory bronchioles. In several groups of rats with pulmonary scars, the only scars that significantly collected inhaled carbon particles were those induced by fibrogenic or non-fibrogenic dust. Carbon particles admin. i.v. were accumulated in the same way as inhaled particles, with 1 exception; in these animals, the particles were also accumulated by scars in the process of formation (this was not seen after inhalation of the particles). Since the incidence of lung cancer is not higher in men with silicosis or anthracosis than in the population as a whole, it is concluded that conc. of carcinogens in pulmonary scar tissue has little or no part in the induction of lung cancer in man.

69-1722 THE EFFECT OF PETROLEUM DISTILLATES ON LUNG SURFACTANT. (E.) Keen, T. E. B. (Defence Stand. Lab., Melbourne, Australia). Aust. Paediat. J. 4(4):229-235, 1968.

The pulmonary surfactant layer was studied (by pressure vol. determination) in Wistar rats treated with kerosene, diesel fuel and mineral seal oil. Intratracheal instillation of these distillates, even at the smallest doses tested, caused a marked and dose-dependent reduction of pulmonary stability; the 3 distillates were about equally effective in this respect, while pure paraffin was less effective. After i.v.

admin. of the distillates, only relatively large doses caused consistent pulmonary changes. Instillation of the distillates into the duodenum had no effect; inhalation of vapors or aerosols of the distillates also did not affect the pulmonary surfactant layer. The surface properties of the lungs returned to normal within 48 hr. in all cases, although macroscopic areas of pulmonary damage persisted.

69-1723 THE MECHANISM OF FORMATION OF ASBESTOS BODIES. (E.) Botham, S. K. (U. Reading, England) and P. F. Holt. J. Path. Bact. 96(2):443-453, 1968.

The formation of pulmonary asbestos bodies was studied in guinea pigs inhaling anthophyllite dust (for 3-50 hr.), and sacrificed immediately after the end of inhalation or up to 270 days later. Asbestos fibers appeared first in the bronchioles and then (3 hr. after the end of inhalation) in the alveoli. Hemosiderin granules appeared in the alveolar macrophages after 4-7 days, together with a solubilized iron-containing protein (possibly ferritin), which was diffused throughout the cytoplasm and often adsorbed on 1 of the asbestos fibers (usually the longest). The other asbestos fibers in most macrophages remained uncoated throughout the observation period. Young asbestos bodies appeared after 26-27 days. After 91-270 days, the lungs were consolidated, showing asbestos bodies of a characteristic appearance which were very occasionally fragmented.

69-1724 LUPUS VULGARIS, ISONIAZID, AND CANCER. THE FREQUENCY OF CANCER DEATHS IN 245 ISONIAZID-TREATED LUPUS VULGARIS PATIENTS WITH AN AVERAGE OBSERVATION PERIOD OF 12 YEARS. (E.) Nyfors, A. (Finsen Inst., Copenhagen). Scand. J. Resp. Dis. 49(4):264-269, 1968.

Since experimental animals can develop cancer after admin. of isonicotinic acid hydrazide (INH; Isoniazid) admin., the cancer incidence in 245 INH-treated pts. with lupus vulgaris (av. observation period of 12 yr.) was studied. INH treatment was begun from March 1952-November, 1956. The av. age at the beginning of the survey (December 1, 1967) was 64 yr.; av. duration of lupus was 34 yr. Examination of legal death certificates (through December, 1967) showed 8/51 deaths due to cancer of the ovary (2), pancreas, colon, rectum, breast, larynx, or spinocellular carcinoma in a lupus lesion (1 case each); 6 cancer deaths were expected in a corresponding population with the same age distribution. There were four histologically verified cases of carcinoma in lupus scars (1.7% of the group), but no cases of leukemia. It is concluded that INH is not carcinogenic to man in therapeutic doses (4 mg/kg/day).

69-1725 THE SUSCEPTIBILITY OF VARIOUS STRAINS OF NEONATAL MICE TO THE CARCINOGENIC EFFECTS OF 9,10-DIMETHYL-1,2-BENZANTHRACENE. (E.) Flaks, A. (Sch. Med., Leeds, England). Europ. J. Cancer 4(6):579-585, 1968.

A single dose of 7,12-dimethylbenzanthracene (DMBA; 30 μg s.c. in gelatin) was admin. 1-16 hr. after birth to mice of strains A^F, C57Bl, A^F x C57Bl, C57Bl x A^F, CBA, C3H, CBA x C3H, C3H x CBA, BALB/c, and IF. Most tumors developing in these mice were lung adenomas, leukemias and hepatomas, with a low incidence of other tumor types. Mice of strain A^F and its hybrids and (to a lesser extent) BALB/c and IF mice, developed lung adenomas without treatment, but showed a higher incidence, shortened latent periods and more tumors/mouse after DMBA admin. Strain C57Bl mice developed only 1 lung tumor, while CBA and C3H mice (low pulmonary tumor strains) showed an intermediate lung tumor incidence, after DMBA admin. A similar pattern was apparent in hepatoma formation. In contrast to lung and liver tumors, genetic influence had only a small role in the leukemia incidence. The spontaneous leukemia incidence was moderate in BALB/c mice and low in the other strains; after DMBA admin., mice of all strains except A^F developed leukemia. The leukemia incidence in C57Bl mice admin. DMBA was 0% in males and 15% in females.

69-1726 CARCINOGENIC EFFECT OF N-NITROSOHEXAMETHYLENEIMINE. (Ger.) Schmähl, D. (Ger. Cancer Res. Ctr., Heidelberg, Germany). Naturwissenschaften 55(12):653, 1968.

In male BR46 strain rats (3 mo. old) treated s.c. with N-nitrosohexamethyleneimine (1 dose/wk. of 25 mg/kg; total 1750 mg/kg), the tumor incidence was 10% (6/62 rats), with an av. induction period of 16 mo. The 6 tumors included 3 hemangioendotheliomas and 1 carcinoma of the liver, 1 squamous cell carcinoma of the nasal sinuses and 1 reticulum cell sarcoma of the pancreas. It is concluded that this compound, unlike many other N-nitroso compounds, is more carcinogenic when admin. p.o. than when admin. s.c. (tumors developed in 100% of rats after p.o. admin. of this agent).

69-1727 TRANSPLACENTAL INDUCTION OF MALIGNANT TUMORS OF THE CENTRAL NERVOUS SYSTEM. I. ETHYLNITROSOUREA (ENU) IN BD IX RATS. (Ger.) Ivankovic, S. (Max-Planck Inst. Immunbiol., Freiburg i. Brg., Germany) and H. Druckrey. Z. Krebsforsch. 71(4):320-360, 1968.

In the offspring of several groups of pregnant BD IX rats treated with ethylnitrosourea (ENU; usually in single i.v. doses), both the teratogenic and CNS tumor-inducing effects of ENU were ose- and time-dependent. In rats treated on day 5 of gestation, the fetal LD_{50} was 80 mg/kg compared to 240 mg/kg in adults) and the median eratogenic dose was 46 mg/kg. The doses of ENU nducing CNS tumors in 63% of fetal and adult ats were 5 and 200 mg/kg, resp. No CNS tumors eveloped in rats treated in the first 11 days of estation, but the incidence was nearly 100% in ats treated in the last 1 wk. of gestation. A otal of 821 tumors of the cranial nerves 197/821 = 24%), peripheral nerves (310/821 = 8%), spinal cord (107/821 = about 13%) and/or rain (207/821 = about 25%) developed in 488/543 urviving offspring of rats treated with ENU after ay 12 of gestation. These tumors clinically and istologically resembled the corresponding human umors. The transplacental CNS tumor-inducing ffects of p.o. admin. ENU (in 1 group of rats nd 1 group of golden hamsters) were the same as hose of i.v. admin. ENU. It is suggested that iochemical activation of ENU is possible only fter day 12 of gestation.

9-1728 NERVE TUMORS EXPERIMENTALLY INDUCED BY APPLICATION OF N-METHYL-N-NITROSOUREA N RATS. I. MACROSCOPIC AND LIGHT MICROSCOPIC INDINGS. (Ger.) Güthert, H. (Med. Acad., furt, Germany), D. Schreiber, W. Jänisch and . Warzok. Exp. Path. 2(6):370-380, 1968.

n 11 groups of inbred Hauben or Wistar rats 80-430 g in 10/11 groups) treated with N-methyl--nitrosourea (MNU; total doses, 70-250 mg in ingle or multiple i.v., i.p. or p.o. doses), umors of the nerve roots and/or peripheral nerves eveloped in 76/432 (17.6%) surviving at least 7 days. The intracranial tumors developed ither in the nerves of the cerebellopontile angle r in the trigeminal nerve; 43 animals (10%) nowed tumors of the peripheral nerves. A single ose of MNU (70 mg i.v.) induced no tumors. In roups of rats admin. a total dose of 180 mg (in -18 doses), the tumor incidence varied according o the dosage schedule and the route of admin.; xcept for 1 group of newborn-1-wk.-old Hauben ats treated i.p. (10/31 of these animals eveloped tumors), MNU was less effective when dmin. p.o. or i.p. than when admin. i.v. The umors were classified into 3 stages (early tages, mature tumors, neurosarcoma). The ossibility that these tumors resulted from nvolution of the Schwann cells and the fibrolasts is discussed.

9-1729 OCCUPATIONAL ARSENICAL CANCER SUPERIMPOSED ON PERFORATION OF THE NASAL EPTUM. (Fr.) Grimaud, R., C. Pernot, R. igache and M. Pernot. Ann. Med. Nancy 7:931-936, 968.

rare case of mucocutaneous carcinoma supernposed on perforation of the nasal septum is eported. The pt. had worked at a glass factory or 35 yr., and for 4 yr. had supervised the mixing of the powders used in glassmaking. In addition to arsenic, the pt. had been exposed to potassium bichromate, lime, selenium, salts of lithium, copper, manganese, cobalt, zinc, antimony and barium, and several other toxic chemicals. The pt. reported a history of "irritation" of the upper lip (noted during the winter only) and repeated episodes of rhinitis and conjunctivitis. No arsenic was found in the urine or feces, and no other signs of arsenic poisoning were noted (other skin lesions, g.i. symptoms or neuritis). It is suggested that the perforation of the nasal septum in this pt. may have been caused by exposure to potassium bichromate.

69-1730 COMPARATIVE STUDIES ON THE AMOUNT OF DNA IN CELL NUCLEI OF MOUSE SKIN AFTER ADMINISTRATION OF CARCINOGENIC AND NON-CARCINOGENIC SUBSTANCES. (E.) Inui, N. (Cancer Inst., Tokyo) and S. Takayama. Int. J. Cancer 3(6): 701-711, 1968.

The DNA content/nucleus was determined (by microspectrophotometry of Feulgen-stained preparations) in basal cells from the depilated skin of adult ICR (Hauschka) mice after painting (2 doses/wk.) with 3-methylcholanthrene (MC; 0.05 ml of 0.3% acetone soln.), croton oil (0.05 ml of 1% acetone soln.) or turpentine (0.5% soln.) and from burned skin. The content of DNA/cell nucleus in the hyperplastic epithelium of MC-painted skin was the same as normal skin (modal diploid values were seen in both cases); the mean DNA content in papilloma and atypical hyperplasia was slightly higher, but not significantly different from normal. Nuclear DNA levels in MC-induced squamous cell carcinomas were elevated with a wide range of modal distribution, notably in the diploid to tetraploid region. In the epithelial hyperplasia induced by painting with croton oil or turpentine, nuclear DNA levels were nearly normal. After a burn, the number of regenerating epithelium cells with increased DNA levels was higher 2-5 days after the burn, but over-all DNA levels were essentially normal.

69-1731 A SIMPLIFIED ISOLATION PROCEDURE OF FOUR COCARCINOGENIC PHORBOLESTERS FROM CROTON OIL. (E.) Meyer-Bertenrath, J. G. (U. Marburg, Germany). Experientia 24(12): 1295-1296, 1968.

The cocarcinogenic phorbol esters A1, A3, B1 and B2 were isolated from croton oil by a 3-stage process: O'Keeffe countercurrent distribution (N-heptane:methanol:water), followed by adsorption chromatography, followed by Craig countercurrent distribution (carbon tetrachloride: methanol:water). The cocarcinogenic activities of these phorbol esters were confirmed by papilloma induction experiments in inbred albino mice (SaB) pretreated with 7,12-dimethylbenzanthracene.

69-1732 EFFICACY OF SHORT-TERM SKIN TESTS FOR THE CLASSIFICATION OF SUBSTITUTED ANGULAR BENZACRIDINES ACCORDING TO THEIR CARCINOGENIC ACTIVITIES. (Fr.) Libermann, C. (Inst. Cancer Res., Nat. Ctr. Sci. Res., Villejuif, France), P. Lazar, I. Chouroulinkov and M. Guerin. C.R. Soc. Biol. (Paris) 162(4):835-838, 1968.

The short-term tests used were the destruction of sebaceous glands and the induction of epidermal hyperplasia (measuring the epidermal thickness was at least as accurate as counting the epidermal nuclei) in female albino mice, after treatment with several benzacridine compounds in 0.5% acetone soln. The most active compound in both tests was 7,10-dimethylbenz(c) acridine (which was also active when admin. as an 0.2% soln.), followed by 7,9- and 7,11-dimethylbenz(c)acridine. Little activity was seen with 9,12-, 8,12-, and 10,12-dimethylbenz(a) acridine (in decreasing order of activity). The abilities of these compounds to induce carcinomas and (after s.c. inj.) sarcomas followed the same order of activity as in the short-term tests; the benz(a)acridines were weakly carcinogenic, while the benz(c)acridines were potent carcinogens.

69-1733 POSSIBLE COCARCINOGENIC EFFECTS OF EXTRACTS OF HIGH-DENSITY POLYETHYLENE DESIGNED FOR HOUSEHOLD USE AND FOR USE IN THE FOOD INDUSTRY. (Rus.) Braun, D. D. (Moscow Sci. Res. Inst., USSR). Vop. Pitan. 27(5):78-82, 1968.

Aqueous and oil extracts of commercial polyethylene, stabilized by 2,2-thio-bis-4-methyl-6-tert.-butylphenol (SAO-6) or unstabilized, were fed to groups of mice for 4 wk., prior to skin painting with 3,4-benzpyrene (BP). Controls were fed water and oil prior to BP application. The results in all groups were the same. The first skin papillomas developed 12 wk. after the beginning of BP treatment, and the papilloma incidence was 100% after 33 wk.; malignant transformation of the papillomas was first seen in all groups after 24 wk., and the survival times were the same. Males were more sensitive than females to BP carcinogenesis. It is concluded that these polyethylene extracts had no cocarcinogenic activity.

69-1734 FURTHER ELECTRON MICROSCOPIC STUDIES ON THE MECHANISM OF CARCINOGENESIS: THE SPECIFICITY OF THE CHANGES IN CARCINOGEN-TREATED MOUSE SKIN. (E.) Tarin, D. (U. Leeds, England). Int. J. Cancer 3(6):734-742, 1968.

In the skin of outbred white mice painted for 6 wk. with non-carcinogenic irritants (benzene or turpentine oil), the ultrastructural changes noted in the dermis and epidermis indicated non-specific irritation of these tissues, and differed in several respects from the changes induced by 3-methylcholanthrene (MC). Unlike the non-specific irritants, MC also induced ultrastructural changes in the dermoepidermal junction; it is concluded that these alterations are specific to the carcinogenic process, not the results of non-specific irritation. A disturbance of the interaction between the epithelium and the connective tissue is postulated as an explanation for the behavior of neoplastic tissue.

69-1735 MAST CELLS, CO-CARCINOGENESIS AND ANTI-CARCINOGENESIS IN THE SKIN OF MICE. (E.) Riley, J. F. (Roy. Infirm., Dundee, Scotland). Experientia 24(12):1237-1238, 1968.

Skin papillomas were induced in mice by 1 application of 7,12-dimethylbenzanthracene (0.005% in acetone) and promoted by 20 wk. of treatment with a croton oil fraction (Compound A_1; 3 applications/wk. of 1.5 mg/100 ml acetone.). An intense mast cell reaction developed just below the hyperplastic, premalignant epidermis (reaching max. levels beneath the papillomas) in these mice. Addition of an antioxidant and "anticarcinogen" (sodium selenide, 0.0005%) to the soln. containing the croton oil fraction, abolished both reactions; neither the mast cell reaction nor the papillomas developed. It is concluded that this mast cell reaction is specific for the promotion phase of skin carcinogenesis, whereas other skin reactions such as epidermal hyperplasia (induced by carcinogens, non-carcinogenic promoters and "anti-carcinogens") are non-specific.

69-1736 CARCINOGENESIS AND CELL PROLIFERATION. (E.) Pound, A. W. (Roy. Brisbane Hosp., Australia). New Zeal. Med. J. 67(427): 88-89, 1968.

The effects of pretreatment with various initiating agents (urethan, acetic acid) on the yield of skin or (in 1 experiment) liver tumors resulting from subsequent applications of promoting carcinogens such as 1:2,5:6-dibenzanthracene, croton oil, dimethylbenzanthracene (DMBA) and carbamates were studied in mice. The results suggested that proliferating cells were more susceptible to carcinogens than normal cells, when urethan was used as the initiator. Evidence was presented to suggest that urethan acted on the cells during the DNA replication phase of cell division. The higher yield of hepatomas in partially hepatectomized mice (compared to intact mice) after admin. of urethan or DMBA also illustrated the susceptibility of proliferating cells to carcinogens.

69-1737 SEVERE CIRRHOSIS WITH HEPATIC VEIN THROMBOSIS IN RATS GIVEN CARBON TETRACHLORIDE AND 3-METHYLCHOLANTHRENE. (E.) Reuber, M. D. (NCI, Bethesda, Md.), L. F. Dove and E. L. Glover. Path. Microbiol. (Basel) 32(1):41-48, 1968.

Severe cirrhosis with hepatic vein thrombosis was studied in 3 groups of 12-wk.-old male Buffalo rats, admin. CCl_4 (2 doses/wk. s.c. of 1.3 ml/kg of 50% soln.), 3-methylcholanthrene (MC; 0.033% in diet), or CCl_4 + MC simultaneously. By 12 wk. after the beginning of treatment, hepatic vein thrombosis had developed in 6/12 and severe cirrhosis in 10/12 rats admin. CCl_4 + MC. Control animals or those receiving only MC did not show hepatic lesions. All rats admin. CCl_4 + MC failed to gain wt. and died after 7.5-12 wk. of observation (all controls survived to the end of the 12-wk. experiment). CCl_4 alone induced mild cirrhosis without thrombosis. Hyperplastic liver nodules developed in some rats admin. CCl_4 + MC, but not in those admin. CCl_4 alone.

69-1738 EFFECT OF DIETARY 2-ACETYLAMINOFLUORENE ON RAT LIVER ENZYMES INVOLVED IN THE ANABOLISM AND CATABOLISM OF NUCLEIC ACID PRECURSORS. (E.) Eker, P. (Norsk Hydro's Inst. Cancer Res., Oslo), P. Fritzson, U. Spaeren and J. Efskind. Scand. J. Clin. Lab. Invest. 22(Supp.106):65-77, 1968.

The activities of 15 anabolic and catabolic enzymes were studied in the livers of female black-and-white rats fed diets containing 2-acetylaminofluorene (N-2-fluorenylacetamide; FAA; 0.05%), either in a 3-mo. course or throughout the observation period (263 days in 1 group). Most of the liver tumors induced by FAA were cholangiomas or cholangiocarcinomas. When FAA was removed from the diet, the livers showed signs of cholangioma formation; these changes were partially reversed after removal of FAA from the diet. During FAA admin., uridine deoxyadenosine and kinase activities were not affected, while the activities of all the other anabolic enzymes were increased. Acid phosphatase activity levels and nucleotide dephosphorylation were both increased, while alkaline phosphatase activity was reduced. It is concluded that these enzymes were under the direct influence of FAA.

69-1739 HISTOCHEMICAL ENZYME STUDIES ON NUCLEOSIDE PHOSPHATASE AND CARBOHYDRATE METABOLISM IN RAT LIVER DURING CARCINOGENESIS BY ORAL ADMINISTRATION OF DIETHYLNITROSAMINE. (Ger.) Schauer, A. (U. Munich, Germany) and A. Feichtner. Klin. Wschr. 46(23):1286-1288, 1968.

In 2 series of experiments, 200 Wistar rats (150 and 200 g) were treated for 1-100 days with diethylnitrosamine (DENA; 2 mg/kg/day p.o.; total 0.3-33.3 mg). The livers were examined and activities of glucose-6-phosphatase (G6P) and nucleoside-5'-triphosphatase (N5T) were determined 50-120 days after the beginning of the experiment. No neoplastic changes were noted in the livers after 1-5 doses of DENA (total 0.3-1.6 mg). In groups receiving a larger total dose, loss of enzyme activity was noted in different areas of the liver 20-90 days after DENA was stopped, indicating that the loss of enzyme activity resulted from irreversible changes in the DNA molecule, not from reversible toxic effects of DENA. N5T activity was reduced in sharply defined areas of the liver (periportal, or near the central vein), whereas the G6P reaction was decreased in the center of the acini but not in the peripheral areas. It is suggested that the defect of N5T might denote preneoplastic changes in the liver, while the more diffuse defect of G6P might not.

69-1740 PATHOLOGIC EFFECTS OF AFLATOXIN IN PIGS. (E.) Gagné, W. E. (U. California, Davis), D. L. Dungworth and J. E. Moulton. Path. Vet. (Basel) 5(4):370-384, 1968.

Rations containing peanut meal which contained aflatoxin B_1 (AB; less than 0.002 to 0.810 ppm) were fed for about 107 or 117 days to 108 Duroc-Jersey pigs (12-14 wk. old); toxic effects were studied at the end of AB admin. All doses of AB above 0.233 ppm caused biochemical abnormalities suggesting hepatocellular damage; liver wt. increased above control levels (controls were fed rations containing soybean meal) at the higher doses of AB (above 0.450 ppm); kidney wt. increased insignificantly at the highest doses. Macroscopic lesions directly attributable to AB were seen in some animals admin. 0.615 ppm or over. Most of these lesions involved the livers, which were pale yellow to tan, showed a fine superficial granularity, and were resistant to cutting. Mildest histological lesions included parenchymal anisocytosis, karyomegaly, cytoplasmic degeneration and proliferation of bile ducts and fibrous tissue. Livers of a few animals admin. 0.810 ppm showed centrilobular vascular plexuses and hepatocellular alignment into tubular structures. No liver tumors were found and lipidosis was noted only in the most severely affected livers. The highest AB dose caused a reduction in efficiency of feed conversion and a markedly decreased wt. gain.

69-1741 AFLATOXIN AND LASIOCARPINE INDUCTION OF MASSES OF PERICHROMATIN GRANULES IN THE RAT LIVER. (Fr.) Monneron, A. (Nat. Ctr. Sci. Res., Villejuif, France), C. Lafarge and C. Frayssinet. C.R. Acad. Sci. [D] (Paris) 267(23):2053-2056, 1968.

After a single i.p. inj. of aflatoxin (100-400 µg/rat of 250 g) or lasiocarpine (80 mg/kg), dense masses of perichromatin granules appeared in the nuclei of the livers of adult Wistar rats. These structures appeared within the first 30 min. after treatment, and disappeared between 24 and 48 hr. The granules consisted of ribonucleoprotein (RNP) with a protein core, and were believed to be distinct entities of the segregated nucleolus. Since these hepatocarcinogens block nucleolar RNA synthesis without affecting other types of nuclear RNA, it is suggested that these granules might result from persistent synthesis of a certain type of RNP, and probable blocking of RNP transport into the cytoplasm.

69-1742 AFLATOXINS AND NITROSAMINES: CELLULAR INTERACTIONS AND CARCINOGENESIS. (E.) Lijinsky, W. (Chicago Med. Sch., Ill.). New Zeal. Med. J. 67(427):100-110, 1968.

The incorporation of ^{3}H-labeled aflatoxin B_1 (AB) and aflatoxin G_1 (AG) in acute LD_{50} doses (260 and 100 μC = 1 and 3 mg/animal, resp.) was studied in rats. In the liver, levels of AB incorporation were much higher in protein than in either RNA or DNA (4750, 170 and 630 cpm/mg, resp., after 1 hr.); detectable activity persisted in liver DNA and both liver and kidney protein after 1 mo. In rats admin. dimethylnitrosamine, on the other hand, nucleic acid specific activity was 5 times that of protein. In rats admin. AG, no detectable incorporation into nucleic acids was noted; incorporation into protein was much lower than with AB. These results could not readily be related to carcinogenicity, because no tumors developed under these experimental conditions. It is concluded that the aflatoxins and nitrosamines have different mechanisms of interaction with cellular constituents.

69-1743 The Cytoplasm of Hepatocytes During Carcinogenesis. Electron- and Light-microscopical Investigations of the Nitrosomorpholine-intoxicated Rat Liver. (E.) Bannasch, P. (U. Würzburg, Germany). Berlin, Springer-Verlag, 1968, 105 pp.

Inbred BDI or BDII rats (about 200 g) were treated with N-nitrosomorpholine (NNM; 6-20 mg%, usually 12 mg%, in the drinking water) in several experiments; some were treated continuously until death or sacrifice (2-37 wk.), while others were treated for limited periods (7 or 12 wk.) and sacrificed during or up to 21 wk. after the end of treatment. Light and electron microscopic examination of the liver cells showed 2 different patterns of cytoplasmic toxicity in different areas of the liver lobule. The "acinus-central" pattern, characterized by marked or total depletion of cytoplasmic glycogen deposits and disorganization of the ergastoplasm, was a reversible, cirrhogenic parenchymal lesion, without a significant role in hepatoma formation. The "acinus-peripheral" pattern, characterized mainly by enhanced glycogen storage, was irreversible; hepatomas developed from foci of cells showing this pattern of cytoplasmic toxicity. The "focal glycogen storage disease" induced by NNM in these cells was attributed to an irreversible enzyme deficiency (possibly glucose-6-phosphatase or phosphorylase deficiency). The decisive step towards hepatoma formation was characterized by a reduction of the accumulated glycogen and a concomitant increase in the number of ribosomes, sometimes accompanied by transient fatty infiltration of the cytoplasm. Cytoplasmic changes induced by other liver carcinogens are also discussed, on the basis of an extensive literature survey (about 300 references).

69-1744 PREVENTION BY ARGININE GLUTAMATE OF THE CARCINOGENICITY OF ACETAMIDE IN RATS. (E.) Weisburger, J. H. (NIH, Bethesda, Md.), R. S. Yamamoto, R. M. Glass and H. H. Frankel. Toxic. Appl. Pharmacol. 14(1):163-175, 1969.

In weanling male Wistar rats admin. acetamide (2.5% in diet for 12 mo.), 50% of the rats at risk developed liver tumors after 12-15 mo. of observation, while some also developed hyperplastic nodules. When arginine glutamate (AG; 5.6%) was added to 2.5% acetamide, only 1/27 developed a hepatoma (compared to 9/27 rats fed 2.5% acetamide). AG alone did not induce hepatomas. The hypothesis that acetamide induces hepatomas as a result of chronic intracellular liberation of ammonia was not supported by another experiment: chronic treatment with ammonium ions (4.8% ammonium citrate alone, equimolar with 2.5% acetamide) did not induce liver lesions in rats.

69-1745 CARCINOMA, THYMIDINE UPTAKE, AND MITOSIS IN THE LIVERS OF RATS EXPOSED TO AFLATOXIN. (E.) Newberne, P. M. (MIT, Cambridge, Mass.) and A. E. Rogers. New Zeal. Med. J. 67(427):8-17, 1968.

In 350 male weanling Fisher rats admin. crystalline aflatoxin B_1 (AB; 3 mg/kg in dimethylsulfoxide, p.o.), an accumulation of basophilic debris in the Kupffer cells was seen in 90% of livers after 3-26 hr. AB caused a significant decrease in DNA synthesis and mitosis in liver parenchymal cells and (to a lesser extent) the Kupffer cells lasting up to 50 hr. after admin., after which the liver gradually returned to normal (by 1 wk. after AB admin.). Histological signs of damage were seen in the parenchymal cells and the Kupffer cells within 3 hr. after AB admin., and the number of cells in the portal areas (apparently bile duct cells) increased after 50-74 hr., but livers examined up to 28 wk. after treatment were histologically normal, without signs of increased numbers of bile duct cells.

69-1746 EARLY ELECTRON MICROSCOPIC CHANGES IN THE COURSE OF LIVER INJURY. (E.) Butler, W. H. (Med. Res. Coun. Lab., Carshalton, England). New Zeal. Med. J. 67(427):18-25, 1968.

The ultrastructural changes induced by CCl_4, dimethylnitrosamine, aflatoxin B_1 and actinomycin D in the rat liver, particularly the rough endoplasmic reticulum, are presented. The relation of these ultrastructural changes to the effect of these agents on protein, DNA and RNA synthesis are discussed.

69-1747 THE EFFECTS OF PYRROLIZIDINE ALKALOIDS AND D-TUBOCURARINE ON MITOCHONDRIAL METABOLISM. (E.) Gallagher, C. H. (U. Sydney, Australia). New Zeal. Med. J. 67(427):26-31, 1968.

Results of several experiments using rat liver mitochondria are discussed. Evidence is presented to suggest that the acute hepatotoxic actions of the pyrrolizidine alkaloids (which are mutagenic and probably carcinogenic) and of D-tubocurarine (which is not known to be a carcinogen) result from displacement of nicotinamide adenine dinucleotide from mitochondrial binding sites. The acute toxic effects of the pyrrolizidine alkaloids were apparently not caused by alkylation.

69-1748 HORMONES, CHEMICALS AND LIVER CANCER. (E.) Weisburger, J. H. (NCI, Bethesda, Md.). New Zeal. Med. J. 67(427):44-58, 1968.

Implantation of the MtT/F4 pituitary tumor (which secretes ACTH, somatotropin and prolactin) potentiated the induction of hepatomas by N-hydroxy-2-acetylaminofluorene (N-hydroxy-N-2-fluorenylacetamide: N-OH-FAA; 160 ppm in diet) in intact Fischer rats (both sexes) in a 13-wk. experiment. Subsequent experiments on the metabolism of N-OH-FAA and its primary metabolite, a glucuronide, showed that the pituitary hormones (present in excess in MtT/F4-bearing rats) tended to maintain higher tissue levels of N-OH-FAA or related active metabolites. Temperature effects (higher body temperatures were seen in animals with MtT/F4) also influenced the more rapid development of hepatomas due to excess pituitary hormones. The liver was apparently affected only indirectly by endocrine effects; in these experiments, its responsiveness to hormones was modulated by modification of N-OH-FAA metabolism.

69-1749 ONCOGENICITY OF p-NITROSO-N,N-DIMETHYLANILINE IN RATS. (E.) Goodall, C. M. (U. Nebraska Coll. Med., Lincoln), W. Lijinsky and A. C. Smillie. Proc. Univ. Otago Med. Sch. 46(3):68-70, 1968.

Albino rats (8 wk. old) were treated for 365 days with p-nitroso-N,N-dimethylaniline (200 mg/liter in the drinking water), then observed until natural death (max. 549 days). No lesions were noted in 7/16 males and 6/16 females. Hyperplastic epithelial lesions of the g.i. tract (esophagus and stomach) were noted in 7/16 males and 7/16 females; hyperplastic lesions of the urinary tract (renal pelvis, ureter and bladder) were noted in 3/16 and 6/16, resp. Malignant tumors developed in 5 males and 5 females (esophagus and stomach in 3 and 5, resp.; liver in 1 and 0, resp.; lung in 0 and 1, resp.; lymphomas in 2 and 1, resp.). The overall incidence of malignant and hyperplastic lesions in these rats was 62%; malignant tumors were found in 31%, compared to an estimated spontaneous tumor incidence of less than 3% (after up to 549 days) in untreated rats. It is concluded that this agent is carcinogenic to rats, but is a weaker carcinogen than the cyclic N-nitrosamines.

69-1750 NEW, EFFECTIVE METHOD FOR PROLONGED CARCINOGEN TREATMENT OF THE MUCOUS MEMBRANE OF THE RAT STOMACH. (Rus.) Arkhipov, G. N. (Nutr. Inst., Moscow). Pat. Fiziol. Eksp. Ter. 12(4):73-77, 1968.

Spherical polyethylene ampules (6.5-7.0 mm in diameter) with perforated walls, filled with carcinogens in fatty or oily vehicle, were implanted surgically through the rumen of rats, and fixed into a pouch in the gastric fundus by plastic-coated wire. The best vehicle for the carcinogens was medical-grade vaseline. A 5% suspension of 3-methylcholanthrene (MC) in vaseline was released from the ampules over 8-12 mo. (the MC dosage was 0.01-0.02 mg/day). Of 120 rats treated with MC in this way, 9 developed adenocarcinomas of the stomach within 2 yr. (the earliest tumor was seen after 11 mo.). Tumor induction was enhanced by increasing the number of perforations in each ampule (up to 40). No metastases were seen.

69-1751 TRANSITIONAL CELL TUMORS OF THE RENAL PELVIS IN ANALGESIC ABUSERS. (E.) Bengtsson, U. (U. Goteborg, Sweden), L. Angervall, H. Ekman and L. Lehmann. Scand. J. Urol. Nephrol. 2(3):145-150, 1968.

Histories of analgesic abuse (AA; consumption of at least 1 g/day of phenacetin for at least 1 yr.) were reported by 20/20 male and 122/222 female pts. with chronic, non-obstructive pyelonephritis or renal papillary necrosis (upper age limits were set at 65 and 55 yr., resp.). A follow-up study (1-11 yr.) of 192 of these pts. disclosed epithelial tumors (transitional cell or renal carcinoma) of the renal pelvis in 8/104 with histories of AA (2 other pts. had bladder tumors of the same histology), and 0/88 without such histories. Five more pts. with histories of AA were obtained from a series of 28 pts. with epithelial tumors of the renal pelvis. The tumors in these 13 pts. were more anaplastic and more frequently infiltrative than in 15 pts. without histories of AA, possibly because of later diagnosis (mean ages were 56 and 67 yr., resp.). The cancer pts. with histories of AA included 4 men and 9 women (another female pt. is mentioned in an addendum); the pts. without such histories included 12 men and 3 women. Since more women than men are addicted to phenacetin-containing analgesics, and since the male:female ratio in the group of cancer pts. with AA histories (by comparison to the other cancer pts.) was reversed, a relationship between phenacetin addiction and carcinoma of the renal pelvis is suggested. However, only 3 pts. were still reportedly taking phenacetin-containing analgesics at the time of the diagnosis of cancer; the others reported that they had stopped doing so about 1-8 yr. previously.

69-1752 THE INFLUENCE OF 20-METHYLCHOLANTHRENE ON 17β-ESTRADIOL BINDING TO 9.5-S RECEPTOR MOLECULE FROM RAT UTERUS. (E.) Hierowski, M. (Acad. Med., Poznan, Poland) and J. Madoń. Biochim. Biophys. Acta 170(2):425-427, 1968.

Uteri of 25-30-day-old Wistar rats were used to study the binding (to the 9.5 S receptor molecule) of estradiol (E) while under the influence of 3-methylcholanthrene (MC). The results showed a higher affinity of E (calculated from sucrose gradients) for the 9.5 S region than MC; both E and MC showed a higher affinity for 9.5 S region than the 3.6 S region at low conc., indicating the specific binding of both agents to the 9.5S region. Binding of MC at low conc. at the 3.6S region was much higher then binding of E, and increased with higher conc. of MC. A study of the influence of half-equimolar and equimolar conc. of unlabeled MC on labeled E binding showed that only at the 9.5S region were the differences between labeled E and labeled E + a half-equimolar conc. of MC significant.

69-1753 ABNORMALITIES OF HORMONE SECRETION AND THE FORMATION OF UTERINE CANCER. (Jap.) Taki, I. (U. Osaka, Japan). Saishin Igaku 23(3):513-521, 1968.

The effects of hormones and endocrine ablation on the induction of cancer of the cervix and corpus uteri by 3-methylcholanthrene (MC; doses not stated) were studied in several strains of mice. MC alone induced tumors in 15%; additional treatment with estradiol (E; doses not stated) increased this incidence to 30%. Tumor promotion by E was greater for tumors of the cervix uteri than for tumors of the corpus uteri. The minimum amount of E required for estrogenic activity stimulated MC carcinogenesis. Progesterone and testosterone (doses not stated) reduced the tumor incidence from 20% (with MC alone) to 5-10%. MC induced tumors of the cervix uteri in 7.3% of intact mice; oophorectomy (oox.) increased this incidence to 18.5%. If adrenalectomy was performed in addition to oox., cervix cancer developed in only 3.8% of the MC-treated animals, but additional admin. of E resulted in a higher incidence (22%). MC induction of corpus uteri tumors was reduced by oox. from 20% to 5-9%.

69-1754 ABERRANT GLANDULAR POLYPI OF THE UTERINE CERVIX ASSOCIATED WITH CONTRACEPTIVE PILLS: PATHOLOGY AND PATHOGENESIS. (E.) Govan, A. D. T. (Roy. Matern. Hosp., Glasgow, Scotland), W. P. Black and J. L. Sharp. J. Clin. Path. 22(1):84-89, 1969.

Histologically bizarre but apparently non-malignant polyps of the cervix were found in 5 pregnant women and in 10 women who had taken contraceptives of the combined estrogen + progestational hormone type (mestranol or ethynylestradiol + progestational hormones of the norsteroid type) for 6 mo.-2 yr. The only non-pregnant women showing these polyps were those who were taking hormonal contraceptives; whether the pregnant women had ever taken these contraceptives is not stated. Results of histological examination of these polyps suggested that these lesions are most likely to develop in polyps showing reserve cell hyperplasia, which are already present before contraceptive hormone admin. is begun.

69-1755 ^{3}H-THYMIDINE MICROAUTORADIOGRAPHIC STUDIES ON THE STROMA OF CANCER, SIMPLE AND ATYPICAL HYPERPLASIA EXPERIMENTALLY INDUCED IN THE CERVIX OF MICE. (Jap.) Iida, M. (Chiba U. Sch. Med., Japan). Chiba Igakkai Zasshi (J. Chiba Med. Soc.) 44(4):30, 381-411, 1968.

The uptake of ^{3}H-thymidine into stromal cells of the cervix uteri was studied in 115 female ddN mice with invasive carcinoma (35/115), preneoplastic atypical hyperplasia (18/115; high-grade atypia was noted in 6/18), or non-atypical hyperplasia (62/115) of the cervical epithelium, induced by 3-methylcholanthrene. The number of labeled cells in the proliferating epithelium increased according to the degree of atypia. Parenchymal proliferation during tumor induction was accompanied by (and may have caused) dystrophy and necrosis of the mesenchymal tissue surrounding the atypical cells.

69-1756 EFFECT OF NORETHYNODREL AND EE$_3$ME ON X-RAY-INDUCED OVARIAN TUMOR FORMATION IN MICE. (Jap.) Sekiyama, S. (Jikei U., Tokyo), I. Takahashi, Y. Iwai and M. Matsuba. Horumon to Rinsho (Clin. Endocr. [Tokyo]) 16(5):385-388, 1968.

The effects of a 50:1 mixture of norethynodrel and ethynylestradiol 3-methyl ether (20 μg every 2 days x 1-2 yr. s.c.) on the incidence of ovarian tumors induced by X-irradiation (150 r at age 20-21 days) were studied in female CF-1 mice. The ovarian tumor incidence was studied after 1-2 yr. of observation. No ovarian tumors were seen in untreated controls or in mice treated with the hormones only. In mice treated with X-rays only, the first tumors were detected after 6 mo. and the incidence was 54.5% (24/44 mice). In mice fed the hormones after

-irradiation, the ovarian tumor incidence was 1.9% (15/44 mice). These results, together with he changes in pituitary and ovarian histology, uggested that gonadotropin hypersecretion may e of importance in the formation of ovarian umors.

9-1757 γD-PLASMACYTOMA AND PROGRESSIVE MUSCULAR DYSTROPHY. A COMBINATION OF TWO RARE ISEASES. (Ger.) Michot, F. (Res. Hosp., aufenburg, Germany). Schweiz. Med. Wschr. 8(41):1598-1602, 1968.

rare form of plasmacytoma (IgD paraproteinemia ith a soft tissue tumor) was found in a 54-yr.-ld woman with a 22-yr. history of muscular ystrophy involving the shoulder girdle muscles, ho had been treated with 19-nortestosterone ecanoate (Deca-Durabolin; total dose, 2000 mg) or 6 mo. as symptomatic therapy. No causative elationship between the muscular dystrophy and he plasmacytoma could be established, but it is uggested that the anabolic hormone may have timulated a static plasma cell clone.

9-1758 MALIGNANT LYMPHOMA AS A COMPLICATION OF ANTICONVULSIVE TREATMENT. (Heb.) treifler, M. (Ichilov Hosp. Med. Ctr., Tel viv, Israel), J. Vardi and D. Cohn. Harefuah 5(6):228-230, 266-267, 1968.

woman with a convulsive disorder since child- ood, treated with several anticonvulsants diphenylhydantoin, primaclone, sulthiame and Prodonal"), developed axillary and cervical ymphadenopathy at the age of 29 yr., identified y biopsy as Hodgkin's disease. The differential iagnosis of the true lymphomas that may develop uring continuous anticonvulsant therapy (several uch cases are known), and the benign "pseudo- ymphomatous adenopathy" that is more often ssociated with anticonvulsants, is discussed. xperiments to induce lymphomas in animals with hese agents were unsuccessful.

9-1759 AUTO-ANTIBODY TO 7,12-DIMETHYLBENZ(a) ANTHRACENE-INDUCED LEUKEMIC CELLS IN ATS AS DETECTED BY IMMUNE ADHERENCE. (E.) oshida, T. O. (Aichi Cancer Ctr., Nagoya, Japan), . Imai and T. Sugiyama. Int. J. Cancer 3(6): 20-726, 1968.

n immune adherence hemagglutination method designated IAHA; designed to detect fresh serum utoantibodies to the membranes of leukemic cells), as used to study evidence of naturally occurr- ng autoimmune responses to their own leukemic ells in 16 random-bred Long-Evans rats with eukemia induced by 7,12-dimethylbenzanthracene. utoantibodies to the cell membranes were found n 14/16 rats; none were demonstrable in the ther 2/16. Thymus cells from the leukemic rats used as control preparations) showed no positive IAHA reactions with the sera from the same rats, and the leukemic cells showed no positive reactions with pooled normal rat serum. It is suggested that leukemic rats could produce humoral antibodies against membrane-specific antigens of their own leukemic cells.

69-1760 EFFECT OF ELLAGIC ACID ON THE INDUCTION AND DEVELOPMENT OF SOLID I.R.E. RETICULUM CELL SARCOMA. (It.) Fumarola, D. (U. Bari, Italy), L. Marcuccio and P. Restuccia. Haemat. Arch. 52(9):701-706, 1967.

In adult Sprague-Dawley rats inoc. s.c. with the I.R.E. reticulum cell sarcoma, the mean latent period was 11.4 days and the mean survival time was 29.9 days. In rats treated with ellagic acid (1 or 2 ml/100 g every 2 days, s.c. at the site of tumor inoc.), from the time of tumor inoc. until death, the mean latent periods were 8.8 and 7.5 days, resp., and mean survival times were 26.7 and 24.8 days, resp. No significant differences in tumor histology were seen between the treated and control groups.

69-1761 STIMULATION OF AMP DEAMINASE UPON ENTRY OF HEPATOCYTES INTO THE REPLICATIVE PERIOD IN PRE-CANCEROUS LIVER. (E.) Kizer, D. E. (S.R. Noble Found., Inc., Ardmore, Okla.), B. Cox and B. C. Shirley. Proc. Amer. Ass. Cancer Res. 10:46, 1969.

69-1762 CARCINOGENESIS AND ALKYLATION OF NUCLEIC ACIDS BY CYCLIC N-NITROSAMINES. (E.) Lijinsky, W. (U. Nebraska Sch. Med., Omaha) and A. E. Ross. Proc. Amer. Ass. Cancer Res. 10:51, 1969.

69-1763 TYROSINE AND HOMOCYSTEINE SULFOXIDE POLAR DYES DERIVED FROM LIVER PROTEINS OF RATS FED N-METHYL-4-AMINOAZOBENZENE (MAB). (E.) Lin, J.-K. (U. Wisconsin, Madison), J. A. Miller and E. C. Miller. Proc. Amer. Ass. Cancer Res. 10:51, 1969.

69-1764 EFFECTS OF SEX HORMONES ON ENZYMATIC ESTERIFICATIONS OF N-HYDROXY-2-ACETYLAMINOFLUORENE (N-HO-AAF). (E.) Lotlikar, P. D. (Temple U. Sch. Med., Philadelphia, Pa.). Proc. Amer. Ass. Cancer Res. 10:52, 1969.

69-1765 SELECTIVE INHIBITIORS OF CHEMICAL CARCINOGENS AS PROBES FOR PINPOINTING SPECIFIC MOLECULAR TARGETS. (E.) Matsushima, T. (NIH, Bethesda, Md.) and J. H. Weisburger. Proc. Amer. Ass. Cancer Res. 10:55, 1969.

69-1766 METABOLISM OF THE 8-METHYL ETHER OF XANTHURENIC ACID (XAE). (E.)

Lower, G. M., Jr. (U. Wisconsin Sch. Med., Madison) and G. T. Bryan. Proc. Amer. Ass. Cancer Res. 10:53, 1969.

69-1767 PLASMA CELL TUMOR INDUCTION IN GERM-FREE BALB/c MICE. (E.) McIntire, K. R. (NCI, Bethesda, Md.). Proc. Amer. Ass. Cancer Res. 10:57, 1969.

69-1768 SERIAL TRANSPLANTATION OF 3-METHYLCHOLANTHRENE-TREATED BALB/c MAMMARY NODULE OUTGROWTH LINE D1. (E.) Medina, D. (U. California, Berkeley) and K. B. DeOme. Proc. Amer. Ass. Cancer Res. 10:57, 1969.

69-1769 HISTOCHEMICAL DEMONSTRATION OF CYTOPLASMIC FIBRILS IN EXPERIMENTAL HEPATIC TUMORS. (E.) Miyamoto, M. (Med. Coll. Georgia, Augusta), F. S. Waldrop and S. N. Meloan. Proc. Amer. Ass. Cancer Res. 10:59, 1969.

69-1770 THE UPTAKE OF ESTRADIOL-17β BY DMBA-INDUCED RAT MAMMARY TUMORS REGRESSING SPONTANEOUSLY OR AFTER OVARIECTOMY. (E.) Mobbs, B. G. (U. British Columbia, Vancouver, Canada). Proc. Amer. Ass. Cancer Res. 10:60, 1969.

69-1771 MALIGNANT TRANSFORMATION OF SINGLE PROSTATE CELLS IN VITRO WITH METHYLCHOLANTHRENE (MCA). (E.) Mondal, S. (U. Wisconsin, Madison) and C. Heidelberger. Proc. Amer. Ass. Cancer Res. 10:61, 1969.

69-1772 CARCINOGEN UPTAKE BY MAMMARY PARENCHYMAL CELLS. (E.) Moon, R. C. (U. Tennessee Med. Units, Memphis) and D. H. Janss. Proc. Amer. Ass. Cancer Res. 10:61, 1969.

69-1773 7,12-DIMETHYLBENZ(a)ANTHRACENE (DMBA): SELECTIVE CYTOTOXICITY AND INHIBITION OF DNA-SYNTHESIS IN VIVO. (E.) Philips, F. S. (Sloan-Kettering Inst. Cancer Res., New York, N.Y.), S. S. Sternberg, A. P. Cronin and P. M. Vidal. Proc. Amer. Ass. Cancer Res. 10:68, 1969.

69-1774 TRYPTOPHAN AS A CO-CARCINOGEN IN BLADDER CANCER. (E.) Radomski, J. L. (U. Miami Sch. Med., Fla.), W. B. Deichmann and E. Brill. Proc. Amer. Ass. Cancer Res. 10:71, 1969.

69-1775 INFLUENCE OF HORMONES ON PROGRESSION OF PREVIOUSLY INDUCED HYPERPLASTIC HEPATIC NODULES TO CARCINOMAS. (E.) Reuber, M. D. (NCI, Bethesda, Md.). Proc. Amer. Ass. Cancer Res. 10:72, 1969.

69-1776 CORRELATION BETWEEN INFLAMMATION AND TUMOR FORMATION IN AKR/J AND C57BL/6J MICE AFTER APPLICATION OF 7,12-DIMETHYLBENZ(a)ANTHRACENE (DMBA). (E.) Schmid, F. A. (Sloan-Kettering Inst. Cancer Res., New York, N.Y.). Proc. Amer. Ass. Cancer Res. 10:77, 1969.

69-1777 AROMATIC AMINES CARCINOGENICITY IN HAMSTERS. (E.) Sellakumar, A. R. (Chicago Sch. Med., Ill.), R. Montesano and U. Saffiotti. Proc. Amer. Ass. Cancer Res. 10:78, 1969.

69-1778 RELATIONSHIP BETWEEN SELENIUM AND CANCER. (E.) Shamberger, R. J. (Roswell Park Mem. Inst., Buffalo, N.Y.). Proc. Amer. Ass. Cancer Res. 10:79, 1969.

69-1779 HYPOTHYROIDISM AND DMBA RAT MAMMARY CARCINOGENESIS. (E.) Shellabarger, C. J. (U. Michigan, Ann Arbor). Proc. Amer. Ass. Cancer Res. 10:79, 1969.

69-1780 CHARACTERISTICS OF EARLY GENERATION TRANSPLANTS OF CHEMICALLY INDUCED BREAST TUMORS IN FISCHER RATS. (E.) Simpson, W. L. (Detroit Inst. Cancer Res., Mich.), B. Bond, T. Takahashi and C. Small. Proc. Amer. Ass. Cancer Res. 10:82, 1969.

69-1781 ENHANCEMENT OF NUCLEAR RNA SYNTHESIS BY A PHORBOL ESTER TUMOR PROMOTER. (E.) Sivak, A. (New York U. Med. Ctr., N.Y.) and B. L. Van Duuren. Proc. Amer. Ass. Cancer Res. 10:83, 1969.

69-1782 ANTIGENICITY OF METHYLCHOLANTHRENE-INDUCED PREMALIGNANT MAMMARY TISSUES AND THE CARCINOMAS DERIVED FROM THEM. (E.) Slemmer, G. L. (Inst. Cancer Res., Philadelphia, Pa.). Proc. Amer. Ass. Cancer Res. 10:83, 1969.

69-1783 INDUCTION OF CARCINOMAS FROM MOUSE LUNG TRANSPLANTED WITH ASBESTOS. (E.) Smith, W. E. (Fairleigh Dickinson U., Madison, N.J.) and E. Yazdi. Proc. Amer. Ass. Cancer Res. 10:84, 1969.

69-1784 CARCINOGENIC EFFECTS OF METHYLAZOXYMETHANOL (MAM) IN HAMSTERS. (E.) Spatz, M. (NIAMD, Bethesda, Md.), G. L. Laqueur and J. M. Holmes. Proc. Amer. Ass. Cancer Res. 10:86, 1969.

69-1785 LACK OF CARCINOGENIC ACTIVITY OF METHYLCHOLANTHRENE IN THE SQUIRREL MONKEY. (E.) Steinmuller, D. (U. Utah Med.

Ctr., Salt Lake City), L. A. Dillingham and R. T. Prehn. Proc. Amer. Ass. Cancer Res. 10:87, 1969.

69-1786 ABSENCE OF CARCINOGEN-INDUCED IMMUNE DEPRESSION IN MICE RESISTANT TO METHYLCHOLANTHRENE ONCOGENESIS. (E.) Stutman, O. (U. Minnesota Sch. Med., Minneapolis). Proc. Amer. Ass. Cancer Res. 10:89, 1969.

69-1787 SPECIFIC CHROMOSOMAL ABNORMALITIES IN HYDROCARBON-INDUCED RAT LEUKEMIA. (E.) Sugiyama, T. (U. Chicago, Ill.) and Y. Kurita. Proc. Amer. Ass. Cancer Res. 10:90, 1969.

69-1788 THE EFFECT UPON MICE OF A DIET SUPPLEMENTED WITH REFINED CORN OIL. (E.) Szepsenwol, J. (U. Puerto Rico Sch. Med., San Juan). Proc. Amer. Ass. Cancer Res. 10:91, 1969.

69-1789 AN EARLY EFFECT OF 7,12-DIMETHYLBENZ(a)ANTHRACENE ON RAT MAMMARY GLAND DNA SYNTHESIS. (E.) Tominaga, T. (Roswell Park Mem. Inst., Buffalo, N.Y.), P. Libby and T. Dao. Proc. Amer. Ass. Cancer Res. 10:94, 1969.

69-1790 SEX DIFFERENCE IN HEPATOCARCINOGENESIS INDUCED BY DIMETHYLNITROSAMINE. (E.) Vesselinovitch, S. D. (U. Chicago, Ill.). Proc. Amer. Ass. Cancer Res. 10:96, 1969.

69-1791 TUMORIGENESIS IN A/Ki MICE AFTER "CHRONIC DRINKING" OF OLIVE OIL-METHYLCHOLANTHRENE EMULSION DURING ADULT LIFE. (E.) Wheeler, E. J. (Baylor U. Coll. Med., Houston, Tex.), A. G. Liebelt and R. A. Liebelt. Proc. Amer. Ass. Cancer Res. 10:98, 1969.

69-1792 ANTIGENIC SPECIFICITY OF A HEPATOMA INDUCED IN A STRAIN 2 GUINEA PIG BY DIETHYLNITROSAMINE. (E.) Zbar, B. (NCI, Bethesda, Md.), W. H. Churchill, Jr. and H. J. Rapp. Proc. Amer. Ass. Cancer Res. 10:102, 1969.

69-1793 EARLY BIOCHEMICAL AND PATHOLOGIC EFFECTS OF METHYLAZOXYMETHANOL ACETATE (MAM), A POTENT CARCINOGEN. (E.) Zedeck, M. S. (Sloan-Kettering Inst. Cancer Res., New York, N.Y.), S. S. Sternberg, R. W. Poynter and J. H. McGowan. Proc. Amer. Ass. Cancer Res. 10:103, 1969.

69-1794 ELECTROPHORETIC STUDIES OF SERUM PROTEINS IN AFLATOXIN-POISONED DUCKLINGS. (Hun.) Juhász, S. (Vet. Med. Res. Inst. Hungarian Acad. Sci., Budapest) and I. Németh. Kiserl. Orvostud. 20(6):642-650, 1968.

69-1795 THE EFFECTS OF FEEDING TOXIC GROUNDNUT MEAL TO GROWING PIGS AND ITS INTERACTION WITH HIGH-COPPER DIETS. (E.) Barber, R. S. (Nat. Inst. Res. Dairying, Shinfield, Reading, England), R. Brande, K. G. Mitchell, J. D. J. Harding, G. Lewis and R. M. Loosmore. Brit. J. Nutr. 22(4):535-554, 1968.

69-1796 AFLATOXIN B_1 IN UNREFINED PEANUT OIL AND PEANUT PRODUCTS IN TAIWAN. (E.) Kuo-Huang Ling (Nat. Taiwan U. Sch. Med., Taipei), Chang-Mei Tung, I-Fan Sheh, Jia-Jang Wang and Ta-cheng Tung. J. Formosan Med. Ass. 67(7): 309-313, 1968.

69-1797 MAMMALIAN CELL GENETICS, II. CHEMICAL INDUCTION OF SPECIFIC LOCUS MUTATIONS IN CHINESE HAMSTER CELLS IN VITRO. (E.) Chu, E. H. Y. (Oak Ridge Nat. Lab., Tenn.) and H. V. Malling. Proc. Nat. Acad. Sci. USA 61(4):1306-1312, 1968.

See also abstract nos.: 1662,1663,1664,1665,1666,1667,1668,1669,1705,1709,1800,1926,1927,1932,1934, 1935,1936,1937,1959,1965,1975

69-1798 TRANSFORMATION OF FOETAL HUMAN LEUKOCYTES IN VITRO BY FILTRATES OF A HUMAN LEUKAEMIC CELL LINE CONTAINING HERPES-LIKE VIRUS. (E.) Pope, J. H. (Queensland Inst. Med. Res., Brisbane, Australia), M. K. Horne and W. Scott. Int. J. Cancer 3(6):857-866, 1968.

Inoc. with a filtrate of the QIMR-WIL human myeloblastic leukemia cell line, which carries a herpes-like virus (HLV), induced transformation of human fetal WBC after 24-35 days of exposure, resulting in the formation of cell lines resembling those from peripheral WBC of pts. with infectious mononucleosis or leukemia. Transformation was seen in WBC cultures from 5/5 fetuses of both sexes (including cultures of bone marrow, thymus and spleen cells) and with 2 filtrates of QIMR-WIL cells. No transformation was seen with filtrates and culture medium from 2 Burkitt lymphoma cell lines, 1 containing HLV (QIMR-GOR) and 1 without HLV (Raji). Transformed lines fixed complement with human sera that reacted with QIMR-WIL and QIMR-GOR cells; most of the cells were apparently diploid, and a few cells of 8/9 lines showed subterminal constrictions of Group C chromosomes. The properties of the transforming agent (heat and ether sensitivity, sedimentation and filtration properties) were compatible with the HLV of the QIMR-WIL cells.

69-1799 NEW CASE OF HISTIOCYTOSIS "X" WITH ELECTRON MICROSCOPIC STUDY. (Fr.) Gillot, F. (C.H.U. Nantes, France), J. Tusques, M. Collet, G. Pradal and G. Bodin. Arch. Franc. Pediat. 25(9):1073-1081, 1968.

A 3-yr.-old boy with Hand-Schüller-Christian's disease involving the skin and the frontal bone (but without visceral involvement) is described. The frontal bone lesion (an eosinophilic granuloma) had become evident after a head injury 2 mo. before admission. Electron microscopic examination of the bone lesion showed filamentous inclusion bodies with a tubular structure in the histiocytes. These inclusion bodies, which resembled those seen in the Langerhans cells, may be of endogenous (Golgi) or viral origin.

69-1800 RETICULUM CELL SARCOMA AFTER RENAL HOMOTRANSPLANTATION AND AZATHIOPRINE AND PREDNISONE THERAPY. (E.) Doak, P. B. (Auckland Hosp., New Zealand), J. Z. Montgomerie, J. D. K. North and F. Smith. Brit. Med. J. 4(5633):746-748, 1968.

Immunosuppressive therapy (including azathioprine, prednisone, and sometimes actinomycin C) was admin. to 38 pts. with renal homografts; 13/38 died, 11 without signs of malignant disease, and 2/13 (with cadaveric grafts from donors without signs of cancer at autopsy) with reticulum cell sarcoma. These 2 pts. with reticulum cell sarcoma (who died 8-9 mo. after renal homotransplantation) developed severe herpes simplex virus (HSV) infections, complicated by mixed bacterial and Candida infections, 3-5 mo. prior to death. The prolonged immunosuppressive therapy may have increased the risk of malignant lymphoma, either directly or by activating an oncogenic virus. Although a herpes-like virus has been implicated in avian lymphomatosis and at least 1 human tumor (the Burkitt lymphoma), it is pointed out that HSV infections are a relatively common complication of renal homotransplantation (contributing to death in 4 of the authors' pts.). It is suggested that the HSV infection in the 2 pts. with reticulum cell sarcoma was a complication of high-dosage immunosuppressive therapy, coincident to the lymphoma rather than a causative factor.

69-1801 THE CHEDIAK-HIGASHI ANOMALY AND THE ALEUTIAN TRAIT IN MINK: HOMOLOGOUS DEFECTS OF LYSOSOMAL STRUCTURE. (E.) Windhorst, D. B. (U. Chicago Sch. Med., Ill.), J. G. White, A. S. Zelickson, C. C. Clawson, P. B. Dent, B. Pollara and R. A. Good. Ann. N.Y. Acad. Sci. 155(3):818-846, 1968.

The Chediak-Higashi (C-H) anomaly in man ("congenital gigantism of the peroxidase granules"), and the biochemically and clinically similar Aleutian disease of mink, are based on a single autosomal recessive gene, and result in pigmentary dilution and the widespread appearance of anomalous intracellular granules. Evidence is presented to support the hypothesis that the fulminating terminal disease developing in children with the C-H anomaly is a malignant (lymphoma-like) disease, rather than an allergic or infectious process. Electron microscopic examination of the peripheral neutrophils of 2 children with the C-H anomaly, who had developed this lymphoma-like disease, showed virus-like particles in degenerating C-H granules. No virus-like particles had been found in the neutrophils of 1 of these children prior to the development of this terminal condition. It is suggested that the widespread defect in the cell granules present in the C-H anomaly, results in a consistent susceptibility to the development of a virus-associated lymphoma-like disease.

69-1802 ABUNDANT VIRUS-LIKE PARTICLES IN BLOOD CELLS FROM PATIENTS WITH LEUKEMIA. (Fr.) Seman, G. (Anderson Hosp., Houston, Tex.). Rev. Franc. Etud. Clin. Biol. 13(8):763-772, 1968.

Electron microscopic examination showed virus-like particles (VLP) in buffy coat cells from 36/106 pts. (33%) with acute lymphoblastic, myeloblastic or monoblastic leukemia (23/50, 4/10 and 2/2, resp.), and chronic myeloid or lymphatic leukemia (2/22 and 5/6, resp.); no VLP were found in cells from the other 70 pts., including all pts. with myelomonocytic leukemia (2), Hodgkin's disease (7), reticulum cell and histiosarcoma (5), myeloma (1) or mycosis fungoides (1). The morphology of these VLP was studied in preparations from 3 pts. with acute leukemia, whose blast cells showed abundant intracytoplasmic VLP. In some respects, these VLP resembled immature particles of mouse leukemia viruses (MLV), being about 100 mμ in diameter and round or hexagonal, with an internal shell, a core and a cytoplasmic envelope. Several important differences between these VLP and MLV particles were noted, however; for example, the VLP from these pts. budded from the vacuole walls into the surrounding cytoplasm.

69-1803 "HAEMOAGGLUTININ" AND UNUSUAL PARTICLES IN LEUKAEMIC SERA. (E.) Nigro, N. (U. Turin, Italy), L. Benso, M. Rosa-Brunet, C. Ambrosino and G. Papa. Panminerva Med. 10(11): 451-456, 1968.

A hemagglutinin (HA), migrating electrophoretically with the α_2-globulins, was found in low titers in sera from 17 members of a family with 3 cases of childhood acute leukemia, in serum from the 1 surviving leukemic child of this family (who was in remission when the serum was obtained), and in sera from 12/14 healthy children without known contacts with leukemic children. The titers of this HA in the 17 relatives and in the healthy children were similar. The same HA was found in high titers in sera from 2 children with untreated acute leukemia. Electron microscopic examination of the non-HA serum fractions from the healthy subjects disclosed no virus-like particles (VLP). The fractions with high HA activity from the 2 children with untreated leukemia showed many VLP, but no VLP were noted in the other serum fractions. This is the first report of VLP associated with a specific HA serum fraction from pts. with leukemia.

69-1804 ISOLATION OF MYCOPLASMAS IN LEUKEMIA AND OTHER DISEASES. (E.) Altucci, P. (U. Naples, Italy), F. Coraggio, V. Coto, F. De Vargas and G. L. Varone. Acta Haemat. (Basel) 40(1-2):9-17, 1968.

Bone marrow specimens from 32 pts. with leukemia and 43 pts. with other diseases (including 14 with plasmacytoma, Hodgkin's disease, lymphosarcoma or reticulum cell sarcoma, and 2 with epithelial neoplasms) were cultivated in acellular media suitable for the isolation of Mycoplasma (PPLO). Strains of Mycoplasma were isolated from the same low percentage of pts. of both groups (2/32 with leukemia and 2/43 controls, both with non-malignant diseases). No correlation was noted between the isolated Mycoplasma strains and the presence of antibodies in the blood of these 4 pts. The possibility that the Mycoplasma may induce cellular transformation, or have a synergistic or helper role in conjunction with other leukemogenic factors (such as viruses) is considered.

69-1805 RELATIONSHIP OF VIRUSES TO THE ORIGIN OF HUMAN BREAST CANCER. AN EXPLORATORY STUDY OF THE SUBMICROSCOPIC APPEARANCE OF HUMAN BREAST CANCER. (E.) Dmochowski, L. (U. Texas M.D. Anderson Hosp. Tum. Inst., Houston), G. Seman, B. Myers and H. S. Gallager. Med. Rec. (Houston) 61(12):384-387, 411, 1968.

Biopsy specimens from 13 pts. with breast carcinoma and 1 pt. with fibroadenoma were examined by electron microscopy. In 5/13 malignant tumors, structures resembling virus particles were detected. In 3/5 tumors (2 circumscribed duct carcinomas and 1 comedocarcinoma), particles 100-120 mμ in diameter resembling mouse mammary tumor viruses (MTV) were seen. These 3 tumors and 2 others (circumscribed duct carcinomas) showed smaller-sized (30-50 mμ) spherical or spheroid particles with an outer double membrane and an inner dense core, in intracytoplasmic vacuoles, in cytoplasmic inclusions, or extracellularly in the ducts. The fibroadenoma showed particles resembling MTV and mouse leukemia virus particles.

69-1806 A VIRUS-CONTAINING BUFFY-COAT CELL LINE (MA-1) DERIVED FROM A PATIENT WITH CHRONIC THYROIDITIS AND THYROID CARCINOMA. (E.) Maruyama, K. (U. Texas M.D. Anderson Hosp. Tum. Inst., Houston), L. Dmochowski, J. J. Romero and G. R. Swearingen. Med. Rec. (Houston) 61(12):388-396, 1968.

Buffy coat cells were obtained from peripheral blood of a pt. 2 yr. after complete thyroidectomy (carcinoma of the thyroid and chronic thyroiditis) and grown in suspension in tissue culture. The cultured cells appeared to be primitive blast cells of mesenchymal origin. Electron microscopic examination of cells grown in vitro for 96 days revealed immature and mature herpes-type virus particles, with occasional particles resembling mouse leukemia virus (Type C). When tested by the membrane immunofluorescence method, these cells gave negative reactions with autologous and homologous sera before tissue culture, but positive reactions were seen after 4-6 passages (total propagation time, 103-127 days in culture). This was especially noticeable with 1 serum from acute myeloid leukemia (over 99% of the cells were positive in passages 4 through 6).

69-1807 LONG TERM CULTURE OF NORMAL AND NEOPLASTIC HUMAN GLIA. (E.) Pontén, J. (U. Uppsala, Sweden) and E. H. MacIntyre. Acta Path. Microbiol. Scand. 74(4):465-486, 1968.

Stable cell lines (in the sense that no spontaneous neoplastic transformation took place) were derived from normal glial tissue from 14 persons and from 30 malignant gliomas; 4 of the glioma-derived cell lines were capable of indefinite proliferation, the others showed long (up to 12 mo.) but finite life spans. One culture of a Grade III astrocytoma (with perivascular lymphoid infiltration) grew out immunoglobulin-producing lymphoid cells. Of the glioma cultures, 19/30 (63%) were dominated by cytologically atypical cells capable of prolonged serial passage. Cell-free preparations of culture fluids from several glioma-derived cultures did not induce neoplastic transformation in normal glial tissue cultures. Addition of the Engelbreth-Holm strain of Rous sarcoma virus (RSV) resulted in transformation of 3/3 glioma-derived cultures (the transformed cells resembled RSV-transformed human fibroblasts); cells from 1 of these transformed cultures induced sarcomas of the typical RSV type in chickens.

69-1808 AN IMMUNOLOGIC COMPARISON OF FIVE MURINE LEUKEMIA VIRUSES GROWN IN TISSUE CULTURE. (E.) Brown, E. R. (Chicago Med. Sch., Ill.), S. R. Rohlfing and S. O. Schwartz. Canad. J. Microbiol. 14(12):1347-1348, 1968.

Rabbit antisera to the S63 and GC mouse lymphoma viruses (grown on ICR mouse embryo cells) were titrated against similarly prepared antigens from the Friend, Moloney and Rauscher mouse leukemia viruses. The S63 and GC viruses shared the group-specific antigen common to all mouse leukemia viruses, and were closely related to each other and to the other 3 mouse leukemia viruses studied (particularly the Rauscher virus), but the GC and S63 viruses contained another specific antigen, not related to the other 3 viruses. Rabbit antiserum to S63 virus cross-reacted with human lymphoma antigens, but attempts to propagate S63 and GC viruses on human leukemia cells (strain J111) were unsuccessful.

69-1809 EFFECT OF HERPES SIMPLEX VIRUS ON HUMAN EMBRYONIC CELLS LATENTLY INFECTED WITH REOVIRUS TYPE 3. (E.) Bell, T. M. (Makerere U. Coll. Sch. Med., Kampala, Uganda), G. M. R. Munube and E. R. Griffin. Int. J. Cancer 3(6):751-759, 1968.

Continuous infection of a few cells was responsible for a persistent latent infection of human embryonic fibroblasts (HEF) by reovirus type 3 (RV; strains CAN 246 or 271; CAN 271 was isolated from Burkitt's lymphoma cells). Monolayer destruction resulted when these cultures were superinfected with herpes simplex virus (HSV; strain CAN 309, isolated from Burkitt's lymphoma cells). Electron microscopic examination indicated unusual nuclear bodies in many of the doubly infected cells (multinuclear blebs and an unusual "condensed-mass" form of intranuclear HSV), which were not seen in cells infected with HSV alone. Since similar blebs have been found in cultures of Burkitt's lymphoma cells and other human tumors, and in the RV type 3-associated Stanley mouse lymphoma, these results may be of significance to oncogenic transformation.

69-1810 QUANTITATIVE MEASUREMENT OF A MURINE LEUKEMIA VIRUS (RAUSCHER) ANTIGEN. (E.) Sibal, L. R. (NCI, Bethesda, Md.), M. A. Fink and D. D. Robertson. Virology 35(4): 498-504, 1968.

A rhesus monkey antiserum to purified Rauscher mouse leukemia virus (RLV) was used in a passive hemagglutination inhibition (HAI) test for the titration of RLV antigens. This test permitted the direct examination of tissue culture extracts and supernatant fluids of RLV-infected spleen and thymus tissue cultures (from BALB/c mice), as well as plasma and spleen extracts from BALB/c and SPF BALB/c mice, for their RLV content (using tanned sheep RBC as an indicator). Preparations from infected mice and tissue culture showed HAI activity similar to that of standard purified RLV, while uninfected control preparations did not. A good correlation was seen between HAI activity and the number of virus particles counted (by electron microscopic examination), and a significant correlation betwen HAI activity and leukemogenic potency (spleen wt. method); no correlation was seen between HAI activity and the protein content, indicating that plasma proteins and cellular debris did not interfere with HAI activity.

69-1811 LEUKEMIA VIRUS-TUMOR CELL RELATIONSHIP. I. SPONTANEOUS ELIMINATION OF VIRUS FROM SARCOMA ORIGINALLY ASSOCIATED WITH FRIEND VIRUS. (E.) Tokuzen, R. (Nat. Cancer Ctr. Res. Inst., Tokyo) and W. Nakahara. Gann 59(6): 537-539, 1968.

Sonicated cell suspensions and supernatants or filtrates of cell homogenates of transplant generations 86-137 of the NTF reticulum cell sarcoma, which originally developed in a mouse infected with Friend leukemia virus (FLV), were inoc. i.p. into newborn Swiss mice. Sarcoma induction was greatest in mice inoc. with sonicates of the sarcoma; few tumors were seen in mice inoc. with supernatants or filtrates from Seitz filters, and none when filtrates from Millipore filters were inoc. Friend virus leukemia was not detected in these mice after a 60-day observation period, as attested by the small wt. of the spleens (0.1-0.2 g); only 1 mouse in 32 experimental groups was classified as positive for leukemia by the spleen wt. criterion. It is concluded that the NTF sarcoma is causally unrelated to FLV, and that FLV was present as a secondary contaminant in the early transplant generations of the NTF sarcoma (6/11 mice developed leukemia after inoc. of supernatants from homogenates of passage 2 of the tumor).

9-1812 LEUKEMIA VIRUS-TUMOR CELL RELATIONSHIP. II. POSSIBLE EFFECT OF NTF SARCOMA ON CTIVITY AND MULTIPLICATION OF FRIEND VIRUS.

(E.) Nakahara, W. (Nat. Cancer Ctr. Res. Inst., okyo) and R. Tokuzen. Gann 59(6):541-542, 1968.

resh NTF sarcoma extract was incubated for 30 nin. with Friend leukemia virus (FLV)-infected pleen extract in a 1:1 proportion. Dilutions f the mixture or the spleen extract alone were hen inoc. i.p. into normal Swiss mice. By 3 k. after inoc., all groups showed a similar legree of splenomegaly, indicating that the arcoma extract had not inhibited the activity f FLV in vitro. In Swiss mice with 10-day-old .c. implants of the NTF sarcoma, inoc. i.p. ith FLV (spleen extract), a slight but consistent uppression of splenomegaly was seen (compared o controls) after 3 wk. Since Sarcoma 180 cted in the same manner in suppressing FLV-nduced splenomegaly, it is suggested that this ffect may result from the presence of a growing umor (not specifically the NTF sarcoma).

9-1813 THE INFLUENCE OF SEX UPON THE DEVELOPMENT OF FRIEND VIRUS LEUKAEMIA.

(E.) illespie, A. V. (London Hosp. Med. Coll., Engand) and K. E. K. Rowson. Int. J. Cancer (6):867-875, 1968.

orbidity, mortality, presence of viremia and he development of neutralizing and tumor-specific ytotoxic antibodies were studied in Parkes train mice of both sexes sacrificed 1-16 wk. fter i.p. inoc. of Friend leukemia virus (FLV) t several dilutions. Survival times were horter in females than in males. Among mice ith splenomegaly, those with viremia were sually male and those with neutralizing or ytotoxic antibodies were mostly female. Many ice with splenomegaly showed evidence of irculating cytotoxic antibodies. It is conluded that female mice inoc. with FLV are onsiderably superior to males in the capacity o produce cytotoxic and neutralizing antibodies. he more rapid death seen in females was attriuted to tissue damage caused by an immune esponse to the virus or cellular neoantigen.

9-1814 FORMATION OF VIRUS PARTICLES ON THE ERYTHROCYTE MEMBRANES OF MICE INJECTED ITH FRIEND VIRUS.

(Fr.) Zajdela, F. (Inst. ad., Batiment 110, Orsay, France), P. Tambourin, . Wendling and O. Pierre. C.R. Acad. Sci. [D] Paris) 267(26):2394-2396, 1968.

irculating blood cells of 4 Swiss mice in the erminal stages of leukemia induced by Friend eukemia virus (FLV) were examined under the lectron microscope. Numerous Type A particles f FLV were found, budding from the membranes of he mature erythrocytes, the reticulocytes, and he most mature stages of the erythroblasts. Areas of virus proliferation were frequently seen in close proximity to regions of micropinocytosis. No intracellular stages of FLV proliferation were observed. Circulating cells of the erythroid series showed numerous morphological abnormalities.

69-1815 SHARED GROUP-SPECIFIC ANTIGEN OF MURINE AND FELINE LEUKEMIA VIRUSES.

(E.) Geering, G. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.), W. D. Hardy, Jr., L. J. Old, E. De Harven and R. S. Brodey. Virology 36(4):678-680, 1968.

Tissue extracts, plasma or pleural fluid from 14 cats with lymphosarcoma, 14 with unrelated diseases and 8 normal cats were tested by Ouchterlony immunoprecipitation against group-specific (gs) antisera to avian leukemia (ALV) and mouse leukemia (MLV) viruses. The gs antisera for MLV gave positive precipitin bands with ether-treated feline leukemia virus (FeLV) and tissue extracts from 7/14 cases of feline lymphosarcoma, indicating that the antigen was shared by FeLV and MLV. Typical Type C particles, indistinguishable from MLV, were detected by electron microscopic examination in tissues from 3/7 cats tested. The antigen shared by MLV and FeLV was detected in viral pellets and tissue extracts from these cats, and from 1 other cat whose tissues showed no virus particles by electron microscopy. The antigen was not detected in plasma or tissue extracts from 24 cats with other neoplastic or non-neoplastic disorders, or from 7 normal cats (lymph node extracts of 1 normal cat were weakly positive). The gs antisera for ALV were negative when tested against feline viral tissue antigens.

69-1816 CHANGES IN GLOMERULAR ENDOTHELIA CONNECTED WITH GROSS VIRUS INFECTION OF MICE.

(E.) Djaczenko, W. (Inst. Microbiol. U., Rome), J. Grabska, F. Filadoro, R. Pezzi and A. Benedetto. Experientia 24(12):1278-1279, 1968.

Electron microscopic examination of the kidneys of 3 Charles River Swiss mice with fully-developed leukemia induced by Gross leukemia virus (GLV), showed marked changes in the renal tubular epithelial cells and in the endothelial cells of the glomerular capillaries. Type C virus particles were found in the lumina of the glomerular capillaries; some of the endothelial cells showed slender projections, protruding into the lumen, which contained dense, spherical, membraneless particles. It is suggested that this cell system, though not directly involved in the leukemic process, could participate in some processes connected with GLV propagation.

69-1817 REDUCTION OF THE MALIGNANCY OF A MOUSE CELL STRAIN RESULTING FROM CHRONIC INFECTION WITH THE RAUSCHER LEUKEMIA VIRUS IN VITRO. (Fr.) Barbieri, D. (Gustave-Roussy Inst., Villeujif, France) and G. Barski. Rev. Franc. Etud. Clin. Biol. 13(7):703-706, 1968.

When P4 bis cells (a permanent tissue culture line from adult C57BL mouse lung) were infected in vitro with a highly virulent (RR) or an attenuated strain (RC) of Rauscher mouse leukemia virus (RLV), viral antigens appeared on the surfaces of 80-95% of the cells after about 3 wk., and numerous Type C virus particles were seen after 3 mo. of infection. This state of chronic RLV infection was maintained for at least 7 mo. after infection; no changes in the morphology, karyotype or growth rate of the infected cells were noted. The tumor-inducing properties of the P4 bis cell line in 6-8-wk.-old C57BL mice were greatly reduced, however; 100% of mice inoc. with uninfected P4 bis cells (which showed no signs of virus infection) developed rapidly growing sarcomas, but the max. tumor incidence after inoc. of the RLV-infected cells was 23%. The virus-infected P4 bis cells (designated P4 bis RR and P4 bis RC) produced more tumors in newborn mice or in cortisone- or radiation-treated adults than in untreated adult mice. It is suggested that this marked reduction in the tumor-inducing capacity of the P4 bis cell line resulted from antigenic conversion of the cells, in this case by RLV.

69-1818 INCREASED SYNTHESIS OF HYALURONIC ACID BY A MOUSE CELL LINE CHRONICALLY INFECTED WITH RAUSCHER LEUKAEMIA VIRUS. (E.) Hamerman, D. (Einstein Coll. Med., New York, N. Y.), G. Barski, J. K. Youn and H. Green. Rev. Franc. Etud. Clin. Biol. 13(8):800-801, 1968.

Hyaluronic acid (HA) production was studied in 3 thymus + spleen cell lines from Balb/c mice: JLS-V5, chronically infected with Rauscher leukemia virus (RLV); T5 (carrying a highly attenuated, non-leukemogenic variant of RLV), derived from in vivo passages of JLS-V5; and JLS-V6 (not infected). HA production/24 hr. by the JLS-V5 and T5 cells was 3-5 times higher than HA production by the JLS-V6 cells. It is suggested that since RLV and other small RNA viruses receive their final envelope as they pass through the cell membrane, where the enzymes concerned with HA synthesis are also located, this enzymatic activity might be affected by the presence of the maturing virus particles in close relation with the site of the enzyme.

69-1819 STRAIN MC29 AVIAN LEUKOSIS VIRUS: IMMUNOLOGIC RELATIONSHIPS TO OTHER AVIAN TUMOR VIRUSES. (E.) Fritz, R. B. (Duke U. Med. Ctr., Durham, N.C.), A. J. Langlois, D. Beard and J. W. Beard. J. Immun. 101(6):1199-1206, 1968.

In primary chick embryo cell cultures, MC29 avian leukosis (myelocytomatosis) virus was neutralized by antisera against BAI strain A virus (avian myeloblastic leukemia) and 3 strains of avian erythroblastosis virus (R, ES4 and RPL 12). Under similar conditions, an antiserum against MC29 neutralized Rous sarcoma virus (RSV), but RSV antiserum caused less neutralization of MC29. In chickens, a chicken antiserum against MC29 neutralized R and ES4 and (to a lesser extent) BAI strain A. In the presence of hamster antiserum to the group-specific antigen (gs) for the avian leukosis-sarcoma viruses, MC29 and virus-infected cells fixed complement and showed the same immunoprecipitation reactions as BAI strain A virus (and infected cells). It is concluded that MC29 is similar to the family of avian leukosis viruses.

69-1820 EFFECTS OF GENETIC CELLULAR RESISTANCE ON CELL TRANSFORMATION AND VIRUS REPLICATION IN CHICKEN HEMATOPOIETIC CELL CULTURES INFECTED WITH AVIAN MYELOBLASTOSIS VIRUS (BAI-A). (E.) Moscovici, C. (VA Hosp., Gainesville, Florida) and P. K. Vogt. Virology 35(4):487-497, 1968.

Transformation and virus replication patterns were studied in chicken bone marrow and yolk sac cultures, selected for sensitivity or resistance to avian tumor virus subgroups A and/or B, and infected with BAI strain A avian myeloblastosis virus (standard AMV). The results did not support the hypothesis that standard AMV belongs to either of these subgroups (A or B), and could not be explained by postulating either a phenotypically mixed virus or the presence of a subgroup C virus. Two hypotheses are presented to account for the results: that the tumor-inducing principle of AMV stocks is a subgroup B virus, but that cells selectively resistant to subgroup A (C/A) are resistant only to AMV-induced transformation (not to AMV infection or replication); or that this tumor-inducing principle belongs to none of the established avian tumor virus subgroups. Non-transforming avian leukosis viruses of both subgroups A and B were detected in standard AMV stocks (by immunofluorescence studies and by interference patterns with Rous sarcoma virus). Such viruses were also detected in AMV-transformed cells that failed to release transforming AMV. The regression of AMV-induced transformation in cultures selectively resistant to subgroup A (C/A) or to both subgroups (C/AB), but not in cultures selectively resistant to subgroup B (C/B) or sensitive to both subgroups (C/0), suggested a limited life span of AMV-transformed myeloblasts.

69-1821 FOCUS FORMATION BY MURINE SARCOMA VIRUS: ENHANCEMENT BY DEAE-DEXTRAN. (E.) Somers, K. D. (U. Chicago, Ill.) and W. H. Kirsten. Virology 36(1):155-157, 1968.

retreatment of 3T3 cells (mouse embryonic ibroblasts) with the polycation diethylaminothyl-dextran (DEAE-D; for 1 hr. at 36°), prior o inoc. with a mouse sarcoma virus, enhanced ocus formation in these cells 30-fold. The ax. effective conc. of DEAE-D was 25 μg/ml; arger amounts were toxic.

9-1822 ROLE OF IMMUNITY IN THE REJECTION OF TUMORS INDUCED BY MSV VIRUS. EFFECT F THYMOCYTE ANTISERUM. (Fr.) Varet, B. (St. ouis Hosp., Paris), J. P. Lévy, J. C. Leclerc nd A. Senik. Int. J. Cancer 3(6):727-733, 1968.

he spontaneous, complete regression of Moloney arcoma virus (MSV)-induced rhabdomyosarcomas, een in adult BALB/c and C57BL/6 mice receiving o other treatment, was reversed by admin. of a abbit antiserum against thymocytes from 3-wk.-ld mice of the same strains. This antiserum increased the frequency of MSV-induced tumors nd promoted tumor growth; most mice died with rogressive tumors. Lymphocytes obtained from ice immunized against MSV inhibited the growth f the Moloney leukemia virus-induced MC 8 lymphoma. It is concluded that the spontaneous ejection of MSV-induced tumors in adult mice was ediated by immunologically competent lymphocytes.

59-1823 TRANSFORMATION OF A MOUSE CELL LINE BY MURINE SARCOMA VIRUS (MOLONEY). (E.) Yoshikura, H. (Nat. Inst. Health, Tokyo), Y. Hirokawa, Y. Ikawa and H. Sugano. Int. J. Cancer 3(6):743-750, 1968.

Moloney mouse sarcoma virus (MSV)-induced transformation was studied in C3H2K mouse kidney cells. The occurrence of a 1-hit dose response in the presence of an excess of Friend mouse leukemia virus (FLV), and a 2-hit dose response in the absence of FLV, indicated that MSV was defective, and that focus formation by MSV requires a dual infection by MSV and a mouse leukemia virus. MSV infection was most effective in cells infected during the S phase of the cell cycle. MSV foci did not arise by cell division alone, but required secondary infection of surrounding cells (whereas Rous sarcoma virus foci arose by cell division alone).

69-1824 ONCOGENECITY OF MOLONEY SARCOMA VIRUS IN VIVO AND IN VITRO. (Jap.) Sano, S. (Nara Med. U., Japan). Nara Igaku Zasshi (J. Nara Med. Ass.) 19(5-6):626-644, 1968.

In newborn BALB/c mice, i.m. inoc. of Moloney sarcoma virus (MSV) induced rhabdomyosarcomas in 93% after 4 wk. of observation (after 15 wk., 99% had developed sarcomas). In adult mice, MSV induced sarcomas in 50%, with an av. survival time of about 45 days. The tumor-inducing properties of MSV in mice were not reduced by up to 94 days of storage at -20° C. In BALB/c mice inoc. with MSV and mammary tumor virus ("milk agent") at a 2-day interval (at ages 2-6 days), sarcomas developed in 77%; survival times were longer in males than in females under these conditions. MSV did not induce sarcomas in newborn golden hamsters. Attempts to propagate MSV in tissue culture (monolayers of MSV-induced mouse sarcomas or MSV-infected whole embryo cultures from strain A mice) were successful.

69-1825 INHIBITORY EFFECT OF INTERFERON PREPARATIONS ON THE DEVELOPMENT OF FOCI OF ALTERED CELLS INDUCED IN VITRO BY MOUSE SARCOMA VIRUS. (E.) Peries, J. (St. Louis Hosp., Paris 10), M. Canivet, B. Guillemain and M. Boiron. J. Gen. Virol. 3(3):465-468, 1968.

Pretreatment with interferon (from the brains of BALB/c mice inoc. intracerebrally with West Nile virus) significantly inhibited focus formation in secondary monolayer cultures of Swiss mouse embryo cells infected with Moloney sarcoma virus (MSV). If interferon and MSV preparations were mixed just before the virus was added to the cultures, focus-forming activity was not inhibited. Interferon did not affect MSV adsorption to the cells, suggesting that the reduced virus yield resulted from an intracellular event.

69-1826 REPLICATION OF MURINE SARCOMA VIRUS-HARVEY (MSV-H) IN TISSUE CULTURES OF VIRUS-INDUCED SARCOMAS. (E.) Harvey, J. J. (London Hosp. Med. Coll., England). J. Gen. Virol. 3(3):327-336, 1968.

Sarcomas induced in 13 newborn BALB/c mice, 1 newborn Sprague-Dawley rat and 5 newborn Syrian golden hamsters by the s.c., i.m. or i.p. inoc. of the Harvey sarcoma virus (HSV), were established as cell lines and maintained in vitro for up to 194 days. Filtered culture fluids from these tumor cell cultures were inoc. into newborn BALB/c mice to determine HSV activity. The mouse and rat tumor cultures contained infective HSV, which showed the same biological behavior in mice as HSV derived from infected animals (high doses induced erythroblastic splenomegaly, with or without sarcomas; low doses induced lymphocytic leukemia). The hamster tumor cell cultures contained typical Type C virus particles; filtrates of these culture fluids did not induce tumors in newborn mice, but 1/5 of the filtrates induced the characteristic HSV lesions in newborn hamsters. The culture fluid filtrates from cell cultures maintained for 4-6 mo. showed the same activity as fluids from cultures maintained for shorter periods of time.

69-1827 THE STIMULATING EFFECT OF COMPLETE FREUND'S ADJUVANT ON TUMOUR INDUCTION BY POLYOMA VIRUS IN MICE AND BY ROUS SARCOMA VIRUS IN RATS. (E.) Ter-Grigorov, V. S. (Gamaleya Inst. Epidem. Microbiol., Moscow) and I. S. Irlin. Int. J. Cancer 3(6):760-764, 1968.

In newborn CC57BR/Mv mice inoc. s.c. with polyoma virus (PV) in Freund's adjuvant, the tumor incidence was 74% (20/27), while 55 controls inoc. with PV alone failed to develop tumors. When Rous sarcoma virus (RSV; Carr-Zilber strain) in Freund's adjuvant was inoc. s.c. into Wistar rats of different ages (newborn, sucklings, or 2.5 mo. old), the tumor incidence was 100% in each age group. In newborn control rats (0-4 days old) inoc. with RSV alone, the tumor incidence was no more than 30-40%; control rats inoc. when over 2 wk. old showed no tumors. Measurable quantities of complement-fixing antibodies to soluble RSV antigens were found in 30% of rats inoc. with RSV in adjuvant, while RSV alone produced no such antibodies. It is suggested that Freund's adjuvant stimulated tumor induction by PV and RSV by a mechanism similar to the classical "enhancement phenomenon."

69-1828 INTERFERENCE PHENOMENON IN THE CULTURE OF CHICK EMBRYO CELLS INFECTED WITH SCHMIDT-RUPPIN STRAIN OF ROUS SARCOMA VIRUS. (E.) Hara, K. (Kyoto U., Japan). Jap. J. Microbiol. 12(14):385-394, 1968.

Culture fluids of chick embryo cell cultures, infected with the Schmidt-Ruppin strain of Rous sarcoma virus (RSV), contained substance(s) which interfered with the development of transformed foci (the foci reached a max. of about 5% of the cells at an input multiplicity of 0.7, and did not increase at higher RSV doses). A similar inhibitor was noted in RSV-infected chick embryo chorioallantoic membrane. The conc. of the inhibitor(s) in the culture medium increased with the duration of RSV infection. The inhibitor(s) consisted of particulate and low molecular wt. fractions, both apparently of viral origin (possibly inactivated RSV particles and their degradation products, released into the medium during prolonged cultivation).

69-1829 INDUCTION OF DEOXYCYTIDYLATE DEAMINASE AND URIDINE KINASE AND ACTIVATION OF CELLULAR DNA SYNTHESIS IN THE COURSE OF TRANSFORMATION OF CHICKEN EMBRYO CELLS INFECTED BY ROUS SARCOMA VIRUS IN VITRO. (E.) Kára, J. (Czechoslovak Acad. Sci., Prague). Folia Biol. (Praha) 14(4):249-265, 1968.

In chick embryo fibroblasts infected with Rous sarcoma virus (RSV; Schmidt-Ruppin strain), under conditions permitting the transformation of over 60% of the cells within 72 hr., this morphological and neoplastic transformation was preceded by the induction of deoxycytidylate deaminase and uridine kinase, and the activation of cellular DNA synthesis. The induction of both enzymes was independent of RSV replication; deoxycytidylate deaminase induction was independent of cellular DNA synthesis. It is concluded that the induction of these 2 enzymes and of cellular DNA synthesis is probably part of the mechanism of tumor induction by RSV (as well as by DNA-containing tumor viruses).

69-1830 KINETICS OF THE DEVELOPMENT OF ROUS SARCOMA VIRUS (SCHMIDT-RUPPIN STRAIN). ESTIMATION OF THE MATURATION TIME BY ELECTRON MICROSCOPIC AUTORADIOGRAPHY. (Fr.) Rabotti, G. F. (Coll. France, Paris), S. Fiske and F. Haguenau. C.R. Acad. Sci. [D] (Paris) 267(25):2243-2246, 1968.

In chick embryo fibroblasts infected with Rous sarcoma virus (Schmidt-Ruppin strain), autoradiographic studies using ^{3}H-uridine indicated a maturation time of over 4 hr.

69-1831 PROTEINS OF ROUS SARCOMA VIRUS. (E.) Duesberg, P. H. (U. California, Berkeley), H. L. Robinson, W. S. Robinson, R. J. Huebner and H. C. Turner. Virology 36(1):73-86, 1968.

Polyacrylamide gel electrophoresis was used to compare the proteins of purified Bryan strain Rous sarcoma virus (RSV) containing Rous-associated virus (RSV[RAV]), avian myeloblastosis virus (AMV), the non-defective Schmidt-Ruppin strain of RSV (SR-RSV), and defective RSV (RSV(0) or the NP particle). After labeling for 24-48 hr. with radioactive amino acids, 2 major and 1 minor protein components, accounting for 60-80% of the total radioactivity, were found in RSV(RAV), SR-RSV and RSV(0). The 2 major protein components (RSV_1 and RSV_3) gave a positive reaction in complement fixation tests with antibody against the internal, group-specific antigen of avian leukosis viruses, indicating that this group-specific antigen consists of at least 2 different protein molecules. The electrophoretic pattern of AMV proteins resembled those of RSV (RAV). Since helper virus-free defective RSV(0) contained all the protein components of the group-specific antigen, it is concluded that the defectiveness of RSV(0) is not based on the lack of the group-specific antigen in the virus particle, but is a property of its outer lipoprotein envelope (strain-specific antigen).

69-1832 A METHOD FOR THE PROPAGATION OF LARGE AMOUNTS OF ROUS SARCOMA VIRUS. (E.) Bader, J. P. (NCI, Bethesda, Md.). Virology 36(1):140-142, 1968.

The Schmidt-Ruppin and RSV(RAV_1) strains of Rous sarcoma virus (RSV) were obtained in high yields when sparse monolayers of chick embryo cells ere exposed to the virus at input multiplicities f 1-10 FFU/cell for 2-3 days, then trypsinized nd transferred to spinner cultures. Virus ields were highest when the suspension medium ontained 20% fetal calf serum. Cells infected ith Rous-associated virus (RAV_1) grew minimally, ut virus yields under these conditions were omparable to virus yields from monolayer cul-ures. Cells infected with RSV(RAV_2) grew oorly, possibly because of the toxicity of RAV_2 o chick embryo cells under these conditions.

9-1833 CARCINOGENESIS BY AVIAN SARCOMA VIRUSES. X. THE DECREASED REQUIREMENT FOR NSULIN-REPLACEABLE ACTIVITY IN SERUM FOR CELL ULTIPLICATION. (E.) Temin, H. M. (U. Wisconsin, adison). Int. J. Cancer 3(6):771-787, 1968.

n uninfected primary chick embryo fibroblast ultures, and in cells converted by avian sarcoma iruses (Schmidt-Ruppin strain of Rous sarcoma irus, or 2 strains of the Fujinami virus) the resence of 1 U (molecule) of serum factor or nsulin stimulated cells at the G-1 stage of ivision to continue through the cell cycle. n the absence of serum factor or insulin, the onverted cells continued to divide, but the ninfected cells continued only to the next G-1 tage.

9-1834 INDUCTION OF MAMMARY TUMORS BY INJECTION OF CELL-FREE EXTRACTS OF PS EUKEMIAS INTO MICE OF OTHER STRAINS. (Fr.) ouriquand, J. (Fac. Med., Grenoble, France), . Mouriquand and C. Viala. Europ. J. Cancer (6):563-570, 1968.

fter 25 generations of inbreeding, PS strain ice showed spontaneous mammary tumors in 35.8%, eukemia in 22.8%, and both neoplasms in 4.2%. hen cell-free preparations of PS strain leukemias (or leukemic isografts) were inoc. into ewborn and weanling BALB/c/Gif or C3H/eB/Gif ice, mammary tumors developed in 62.5% and 66% f the female 9-mo. BALB/c and C3H survivors, resp. (compared to 0% and 2.1%, resp., of the ntreated controls), but none of the inoc. or control mice developed leukemia. In Swiss/Gif mice, 23% of the inoc. females developed mammary tumors (compared to 7.3% of the untreated controls), 28.5% of the inoc. mice of both sexes developed lung tumors (compared to 6.8% of the controls), and 2 inoc. mice developed leukemia associated with other tumors (mammary in 1/2, lung in 1/2). In strain PS mice inoc. with these cell-free preparations, mammary tumors and leukemia developed in 72.4% and 10.3% of the females (compared to 62.5% and 3%, resp., of the controls); leukemia developed in 20% of the inoc. males (compared to 7.6% of the controls). In PS mice, the mean ages at the onset of these tumors were much lower in inoc. mice than in controls. A few inoc. mice of all strains developed tumors of other types, predominantly sarcomas. It is suggested that the tumors of PS mice contain a mammary tumor virus and a leukemia virus, but not polyoma virus.

69-1835 ELECTRON MICROSCOPIC STUDY OF VIRUS PARTICLES IN EXPERIMENTALLY MIXED TUMOR CELLS. (E.) Y. Saito (Kitasato Inst., Tsurumi, Japan), K. Tawara, S. Nakagawa, Y. Suzuki and H. Machiguchi. Kitasato Arch. Exp. Med. 40(1-4):25-29, 1967.

CFW, C3H and DDN mice were inoc. s.c. with mammary tumor virus (MTV)-containing mammary tumor cells (from CFW and C3H mice), mixed with either Sarcoma 180 or Ehrlich carcinoma (EC) cells (from CFW, C3H or DDN mice). These mixed tumors were histologically carcinomas, without the acinar structure of the mammary tumors. The CFW and C3H mammary tumors were readily transplantable into CFW and C3H mice, resp., but not into DDN mice; all strains accepted EC transplants. The MTV particles in these mixed tumors were morphologically atypical; the cytoplasmic Type A particles often resembled those of an incomplete virus, while the extracellular Type B particles resembled those of mouse leukemia virus (Type C). Coinciding with the appearance of these morphological changes in the MTV particles, the transplantability of the mixed tumors decreased. Similar changes in MTV morphology were noted in mixed tissue cultures of EC and mammary tumor cells.

69-1836 STRUCTURAL RELATIONSHIPS BETWEEN THE RNA OF MAMMARY TUMOR VIRUS AND THOSE OF OTHER RNA TUMOR VIRUSES. (E.) Duesberg, P. H. (U. California, Berkeley) and R. D. Cardiff. Virology 36(4):696-700, 1968.

Mammary tumor virus (MTV) was propagated in mouse mammary tumor cell cultures, labeled with ^{3}H-uridine and purified. The 62S component of MTV RNA was disaggregated by heat or dimethyl sulfoxide, to subunits with sedimentation coefficients and electrophoretic mobilities very similar to those of melted RNA from Rous sarcoma virus or Rauscher mouse leukemia virus suggesting that MTV RNA is an aggregate of smaller molecules linked together by physical bonds. The molecular wt. of the largest subunit of MTV RNA was estimated at approx. 3×10^6 daltons. It is concluded that the RNA of MTV, like that of other RNA tumor viruses, has an aggregate structure consisting of a major 37S RNA component and smaller RNA molecules.

69-1837 ESTABLISHMENT OF A MILK AGENT-FREE SUBSTRAIN C3HeB/Os AND EFFECT OF FOSTER NURSING ON OCCURRENCE OF MAMMARY TUMORS. (E.) Akamatsu, Y. (Osaka U. Sch. Med., Japan), R. Ikegami and K. Watanabe. Gann 59(6):547-549, 1968.

A subline of the mammary tumor virus (MTV)-free C3HeB strain of mice was designated C3HeB/Os after inbreeding for 20 generations. In the F_1 to F_{10} generations, spontaneous mammary tumors developed in 2.1% of 193 females (living more than 40 wk.); other tumors included pulmonary adenomas in 3.1%, abdominal lymphomas in 6.2% and ovarian cysts in 2.1%; tumors seen in 174 males included hepatomas in 14.3% and abdominal lymphomas in 4%. Foster-nursing experiments were performed in mice of strains C3H (MTV-positive), C57BL and C3HeB (MTV-free). In C3HeB/Os mice foster-nursed by C3H mothers, 81.3% developed mammary tumors; in the offspring of these infected females, 42.9% developed tumors. In C3H females foster-nursed on C3HeB mice, the mammary tumor incidence decreased from 92.5% (breeders of strain C3H) to 15.8%; in their offspring, the incidence was 75%. MTV-free C57BL mice were resistant to the agent and developed no mammary tumors when foster-nursed on C3H mice; in C3H females foster-nursed on C57BL mothers, the tumor incidence was 16.1%. It is concluded that the C3HeB strain is susceptible to MTV infection through the milk, but cannot transmit the agent to the offspring, whereas the low-mammary tumor C57BL strain is resistant to MTV infection.

69-1838 BASE COMPOSITION OF THE DNA OF ONCOGENIC SIMIAN ADENOVIRUS SA7 AND HOMOLOGY WITH HUMAN ADENOVIRUS DNA'S. (E.) Piña, M. (St. Louis U. Sch. Med., Mo.) and M. Green. Virology 36(2):321-323, 1968.

The guanine + cytosine (G + C) content of DNA from SA7, a highly oncogenic simian adenovirus (AV), was 58-60%, compared to 56% for a non-oncogenic simian AV (SV15), 55-61% for the non-oncogenic human AV's (including AV-2), 49-52% for the weakly oncogenic human AV's (including AV-7), and 48-49% for the highly oncogenic human AV's (including AV-12). DNA's from SA7 and SV15 shared 9-23% of their nucleotide sequences with AV-12, AV-7 and AV-2; no homology was seen between the DNA's of AV-12 and SV40. SV7 was an exception to the previously reported G + C content observed for all other oncogenic DNA viruses. It is suggested that the portion of the relatively large AV genome that is involved in tumor induction, is the portion that has a low G + C content. It is also suggested that SA7-transformed cells (like cells transformed by non-oncogenic human AV's) may synthesize virus-specific RNA with a lower G + C content than that of viral DNA.

69-1839 GENETIC STUDIES WITH TUMORIGENIC ADENOVIRUSES. I. ISOLATION OF CYTOCIDAL (cyt) MUTANTS OF ADENOVIRUS TYPE 12. (E.) Takemori, N. (California State Dept. Pub. Health, Berkeley), J. L. Riggs and C. Aldrich. Virology 36(4):575-586, 1968.

Several cytocidal mutants (designated cyt), identifiable by their different CPE's in human embryo kidney (HEK) cells, were isolated from stocks of the highly tumorigenic Huie and 1131 strains of adenovirus type 12 (AV-12). The frequency of these spontaneous mutants was approx. 0.001%; UV irradiation increased this frequency about 5-fold. Under conditions of mixed infection, the CPE of the parental stock (designated cyt+) was dominant. The cyt mutants, unlike the parental strains, did not transform newborn hamster kidney cells in vitro, and proved less tumorigenic than the resp. parent strains (with 1 exception). However, the cyt mutants enhanced the tumor-inducing effects of AV-7, AV-3, and 3 low-tumorigenic cyt+ strains of AV-12 (Bersiak, 97838 and 10516), though they did not cooperate with AV-2, AV-4 and AV-5. It is suggested that the cyt gene is responsible for both the tumor-inducing effects and the cyt+ CPE of AV-12.

69-1840 HUMAN CELL STRAINS SUSCEPTIBLE TO FOCUS FORMATION BY HUMAN ADENOVIRUS TYPE 12. (E.) Todaro, G. J. (NCI, Bethesda, Md.) and S. A. Aaronson. Proc. Nat. Acad. Sci. USA 61(4):1272-1278, 1968.

In several strains of human fibroblasts (embryonic lung, newborn foreskin and adult skin), approx. equally susceptible to lytic infection by vesicular stomatitis or polioviruses, a close parallel was observed between the susceptibility to SV40 transformation and the susceptibility to transformation by adenovirus type 12 (AV-12; Huie strain). The SV40 and AV-12 foci were morphologically distinguishable from each other. The embryonic lung fibroblasts were apparently less susceptible to AV-12 and SV40 than at least some of the adult fibroblast strains. The cell strains proving most susceptible to both SV40 and AV-12 were derived from 2 pts. with Fanconi's anemia and a member of a "transformation-prone" family; it is suggested that such highly susceptible cell strains could be used to detect human tumor viruses.

69-1841 VIRUS-INDUCED CHROMOSOME CHANGES. (E.) Aula, P. (U. Helsinki, Finland), W. W. Nichols and A. Levan. Ann. N.Y. Acad. Sci. 155(3):737-747, 1968.

Chromosomal breakage (single breaks are of mutagenic significance, especially in tumor induction), induced in human WBC cultures by adenovirus type 12, measles virus or Rous sarcoma virus (when added during the time of cellular DNA synthesis), was identical to the chromosomal breakage observed after addition of inhibitors of DNA synthesis (deoxyadenosine, 5-fluoro-2'-deoxyuridine, cytosine arabinoside, etc.). No chromosomal breakage was seen in cultures infected with the non-oncogenic adenovirus type 2. In contrast to the responses of irradiated WBC cultures, chromosomal rearrangement in the virus-infected cultures was infrequent. This chromosomal breakage was not dependent on lysosomal enzymes. Results of preliminary experiments with arginine-dependent species of *Mycoplasma* (PPLO; *M. salivarium* and *M. hominis* Type II in particular) suggested the involvement of metabolic and environmental factors (in this case, addition or depletion of arginine in the medium) in the induction of chromosomal breakage.

69-1842 SEARCH FOR AN ADENOVIRUS ETIOLOGY OF HUMAN ORAL AND PHARYNGEAL TUMORS. (E.) Rangan, S. R. S. (Johns Hopkins U. Ctr. Med. Res. Train., Baltimore, Md.), A. L. Mukherjee and F. B. Bang. *Int. J. Cancer* 3(6):819-828, 1968.

The type of cellular outgrowth from normal or malignant human oropharyngeal mucosal epithelium was studied in biopsy specimens cultivated on rat collagen substrates. Antigens similar to the intranuclear T antigen in hamster tumors induced by adenovirus (AV) types 7,12,18,21 and 31 were not found by immunofluorescence in secondary cellular outgrowths from 25 different oropharyngeal tumors. Sera from 88 pts. were tested (by indirect fluorescence staining) for the presence of antibodies against AV type 12 viral and T antigens. Antibodies to AV type 12-induced T antigens occurred at nearly the same frequency in sera from pts. with no malignancy (17%), oral or pharyngeal tumors (23%) or tumors at other sites (24%). Antibodies against AV type 12 viral antigens were found in 44% of the sera, but only 50% of these positive sera contained antibodies against AV type 12-induced T antigen. No antibodies to the T antigen were seen in the viral negative sera.

69-1843 SEPARATION OF TWO COMPONENTS OF ADENOVIRUS TYPE 12 INDUCED T-ANTIGENS WITH SEPHADEX G-50. (E.) Erb, P. (U. Inst. Microbiol. Hyg., Basel, Switzerland), M. Gasser and H. Loeffler. *Experientia* 24(12):1264-1265, 1968.

Crude tumor (T) antigen extracts, from transplanted hamster tumors induced by adenovirus type 12, were separated into 2 fractions (designated CI and CII) by filtration on Sephadex G-50. CI contained complement-fixing activity and was heat-labile and oxygen-stable. CII contained low levels of complement-fixing activity (detected only after 6-10-fold conc. of this fraction) and proved heat-stable and oxygen-sensitive. CI was eluted in fractions 1-8 of the column (and therefore had a molecular wt. of over 30,000) and CII was eluted in fractions 16-27 (its molecular wt. was below 30,000).

69-1844 VIRUS-ASSOCIATED GAIN AND LOSS OF PROLIFERATIVE AND NEOPLASTIC PROPERTIES OF NORMAL AND VIRUS-TRANSFORMED DIPLOID CELL LINES. (E.) Yerganian, G. (Harvard Sch. Med., Boston, Mass.), M. A. Nell, Sah Sook Cho, A. H. Hayford and Ti Ho. *Nat. Cancer Inst. Monogr.* 29:241-268, 1968.

In a large number of cell lines derived from Armenian and Chinese hamsters (including normal diploid cell lines from embryonic and adult animals, and cell lines from spontaneous or radiation-induced tumors), the development of *in vitro* lines with proliferative and neoplastic properties was rare. Evidence is presented to suggest that "spontaneous" transformation into tumor-inducing cell lines was in fact the result of exposure to a virus (SV40 was implicated in several cases), and that the exceptional properties of these cell lines were apparently directly related to the presence or absence of the appropriate T antigen.

69-1845 MORPHOLOGY OF TUMORS INDUCED IN HAMSTERS BY SIMIAN ADENOVIRUSES. (E.) Levenbook, I. S. (Tarassevich State Control Inst. Med. Biol. Prep., Moscow), A. E. Chigirinsky, E. M. Tsetlin, N. N. Dodonova and A. D. Altstein. *Int. J. Cancer* 3(6):712-719, 1968.

The s.c. tumors induced in newborn hamsters by 3 strains of simian adenovirus SA7 (C8,B105 and C626) were poorly differentiated sarcomas, morphologically distinguishable from the s.c. tumors induced by papovaviruses (SV40 or polyoma) and Rous sarcoma virus. The B105- and C626-induced tumors were morphologically similar. All C8-induced tumors in the s.c. tissue, muscle, peritoneum, and mediastinum were morphologically identical to each other and to the B105- and C626-induced tumors, but C8-induced brain tumors were generally malignant ependymomas and choroid plexus carcinomas (of neuroectodermal origin). It is concluded that adenovirus C8 is oncogenic to both the mesodermal and the ectodermal cells.

69-1846 INHIBITION BY H-1 VIRUS OF THE INCIDENCE OF TUMORS PRODUCED BY ADENOVIRUS 12 IN HAMSTERS. (E.) Toolan, H. W. (Putnam Mem. Hosp., Bennington, Ver.) and N. Ledinko. *Virology* 35(3):475-478, 1968.

In newborn hamsters, s.c. inoc. of adenovirus type 12 (AV-12) induced tumors in 32/48 (67%; 3 tumors later regressed). In newborn hamsters inoc. with a mixture of AV-12 and the H-1 virus (10^{-6} dilution, which induced a "mongoloid-like" deformity in about 50% but was not lethal), the tumor incidence was only 28% (11/40 animals). The first tumor developed at age 35 days and the last at age 118 days; no other tumors developed at a later time during the 9-mo.

observation period. The relative amounts or presence of AV-12 T antigens in the tumors, and of serum antibodies to the T antigen, were about the same in these 2 groups. In both groups, the tumor incidence was higher in females than in males. In animals inoc. with AV-12 + H-1, the tumor incidence was lower in animals developing the mongoloid-like deformity (2/15 = 13%) than in animals not developing this deformity (9/25 = 36%). Admin. of H-1 alone did not induce tumors in 40 hamsters. It is concluded that H-1 reduced the incidence of AV-12-induced tumors, but that AV-12 did not significantly affect the response to H-1 virus in newborn hamsters.

69-1847 OBSERVATIONS ON POLYOMA VIRUS FILAMENTS. (E.) Mattern, C. F. T. (NIH, Bethesda, Md.) and A. M. DeLeva. Virology 36(4):683-685, 1968.

Electron microscopic examination of a partially purified suspension of polyoma virus showed at least 5 different forms: "complete" spherical particles about 48 mμ in diameter (presumably DNA-containing icosahedral particles); somewhat larger "incomplete" spherical particles (possibly flattened protein shells), "complete" and "incomplete" filamentous particles (bearing the same relationship to each other as the corresponding spherical particles); and occasional filamentous particles containing DNA in 1 region, but poorly stained and flattened elsewhere.

69-1848 ABSENCE OF HOMOLGY BETWEEN POLYOMA OR SV40 VIRAL DNA AND MITOCHONDRIAL DNA FROM VIRUS-INDUCED TUMORS. (E.) Benjamin, T. L. (Pub. Health Res. Inst. City New York, N.Y.). Virology 36(4):685-687, 1968.

"Closed circular" DNA, from the mitochondria of hamster tumors induced by polyoma virus (PV) and SV40, was hybridized by a modified nitrocellulose membrane method with P^{32}-labeled "closed circular" viral DNA from PV and SV40 viruses. No binding of P^{32}-viral DNA (no counts above background level) resulted when filters were loaded with as much as 2.8 μg of mitochondrial DNA from the virus-induced tumors. In control experiments, as little as $3\text{-}4 \times 10^{-3}$ μg of unlabeled viral DNA (substituted for the mitochondrial DNA) was able to bind P^{32}-viral DNA in amounts 6-8-fold higher than background levels. Since this method could detect as little as 1 part in several thousand of mitochondrial DNA containing sequences capable of hybridizing to viral DNA, it is concluded that no single viral DNA equivalent is present in the mitochondrial DNA in the "closed circular" form.

69-1849 ELECTRON MICROSCOPIC STUDY OF THE TERTIARY STRUCTURE OF COVALENTLY CLOSED POLYOMA VIRUS DNA. (E.) Bourguignon, M.-F. (Free U., Brussels) and P. Bourgaux. Biochim. Biophys. Acta 169(2):476-487, 1968.

In its native state, component I of polyoma virus DNA consisted predominantly of closed supercoiled molecules with a right-handed configuration. After heating in the presence of formaldehyde, the molecules were untwisted (configuration I'). Superheating (above 40° C) restored the twisted configuration (left-handed, in this case; configuration I") to some of the molecules; others remained untwisted or poorly twisted, suggesting that component I may not have behaved as a homogeneous material upon denaturation. Native component I DNA showed a small but significant number of left-handed and left-and-right-handed configurations, suggesting that some of the molecules may have passed through stages I' and (possibly) I" during the separation of component I from components II and III.

69-1850 CONTROL OF DNA SYNTHESIS IN CELLS INFECTED WITH POLYOMA VIRUS. (E.) Branton, P. E. (U. Toronto, Canada) and R. Sheinin. Virology 36(4):652-661, 1968.

Cellular DNA synthesis was stimulated in mouse embryo cells about 12 hr. after infection with polyoma virus (PV; TSP1 strain) at low multiplicity (1-100 PFU/cell). The formation of viral DNA was first detected at this time; cellular DNA synthesis began to decline 24 hr. after infection. Normal cellular DNA was synthesized in the first 12 hr., but the DNA formed 18-36 hr. after infection was increasingly abnormal (as indicated by its chromatographic behavior) and characterized by a much lower molecular wt. Formation of PV capsid protein (as measured by immunofluorescent staining and serum blocking assays) was not detectable before 18 hr. after infection (6 hr. after viral DNA synthesis began). These findings are in contrast to those reported for cells infected with PV at high multiplicity (over 1000 PFU/cell), in which cellular DNA synthesis was blocked and capsid formation occurred at the same time that viral DNA synthesis began. It is suggested that the regulation of cellular DNA synthesis is linked to viral capsid formation in PV-infected cells.

69-1851 A SIMPLIFIED METHOD FOR THE PREPARATION OF HIGH TITER POLYOMA VIRUS. (E.) Taguchi, F. (Kitasato U. Sch. Hyg. Sci., Tsurumi, Japan), K. Hasegawa and D. Nagaki. Kitasato Arch. Exp. Med. 40(1-4):21-24, 1967.

A simplification of Crawford's method for obtaining polyoma virus (PV) in high yield is described. This method used slightly confluent sheets of cultured cells (whole Swiss mouse embryo secondary cultures), prolonged incubation times without changing the medium until nearly all cells showed a CPE, and treatment of the cell debris with RDE soln.

69-1852 INTERACTION BETWEEN NORMAL AND TRANSFORMED BOVINE FIBROBLASTS IN CULTURE. II. CELLS TRANSFORMED BY POLYOMA VIRUS. (E.) Pontén, J. (U. Uppsala, Sweden) and E. H. MacIntyre. J. Cell Sci. 3(4):603-613, 1968.

In mixed cultures of polyoma virus (PV)-transformed B13 bovine embryonic lung fibroblasts, and syngeneic or allogeneic normal cells of the same origin (strains B4, B10, B11 or B13), the growth of the PV-transformed cells was inhibited (especially when the transformed cells were added to normal cells in the post-logarithmic phase of growth). After 96 hr. of contact with stationary normal cells, the PV-transformed cells showed a strong decrease in DNA synthesis. Proliferation ascribable to the transformed cells appeared only after 11 days of cocultivation with stationary normal cells. This growth inhibition, which was not seen in mixed cultures of normal and Rous sarcoma virus (RSV)-transformed bovine embryonic fibroblasts, could not be attributed to a deficient attachment or a rapid detachment of PV cells. It is suggested that PV-transformed cells lacked the "emitter" link but retained the "receptor" link responsible for contact inhibition, whereas RSV-transformed cells should lack the "receptor" link.

69-1853 THE INFECTIVITY OF POLYOMA VIRUS DNA FOR MOUSE EMBRYO CELLS IN THE PRESENCE OF DIETHYLAMINOETHYL-DEXTRAN. (E.) Warden, D. (U. Glasgow, Scotland) and H. V. Thorne. J. Gen. Virol. 3(3):371-377, 1968.

In mouse embryo cell monolayers infected with component I or components II + III of polyoma virus (PV) DNA under isotonic conditions, no plaques developed unless the medium also contained diethylaminoethyl-dextran (DEAE-D). Cultures exposed to DEAE-D prior to PV DNA, or to a mixture of DEAE-D and DNA, showed about the same number of plaques; fewer plaques were seen when the cells were exposed to DNA prior to DEAE-D. Under optimum conditions, the highest specific infectivity obtained for component I was 6 x 10^5 PFU/μg (the specific infectivity of components II + III was lower). Several advantages of the DEAE-D method over the hypertonic method of PV titration are discussed.

69-1854 DEVELOPMENT OF POLYOMA VIRUS IN EXPLANTS OF SALIVARY GLANDS FROM NEWBORN MICE. (Fr.) Raynaud, J. (Pasteur Inst., Val-d'Oise, France) and P. Atanasiu. C.R. Acad. Sci. [D] (Paris) 267(23):2050-2052, 1968.

Submaxillary glands from newborn mice were explanted in vitro, exposed to polyoma virus (PV), for 2 hr. and cultivated for 8-21 days. The first pathological signs of PV infection (epithelial hyperplasia and metaplasia of the acini, with subsequent formation of characteristic transformed nodules) developed after 8-12 days in vitro. Salivary gland explants from mice of the low-tumor XVII strain showed the same pathological changes as explants from mice of the high-mammary-tumor R III strain. Media from 14-16-day-old explants induced similar pathological changes in new salivary gland explants. Emulsions of 16-day-old explants, when inoc. s.c. into newborn hamsters, induced fibrosarcomas at the inoc. site in 6/6 (after 1 mo. of observation). It is suggested that this method could be used in the study of the transplantation and "T" antigens of PV.

69-1855 ISOLATION OF ONCOGENIC VIRUSES OF THE PAPOVA GROUP BY THE OVERLAY TECHNIQUE. (Rus.) Talas, M. (Microbiol. Res. Gr., Hungarian Acad. Med. Sci., Budapest). Vop. Virus. 13(5): 574-580, 1968.

A method for the isolation of DNA-containing tumor viruses, such as SV40 or polyoma virus (PV), from transformed cells or virus-induced tumors is described. The cells (SV40-transformed hamster embryo cells, cells from SV40-induced primary hamster tumors, or from transplantable PV-induced mouse tumors) were first cocultivated with susceptible cells (green monkey kidney cells for SV40, mouse embryo cells for PV); the viruses were then isolated from the mixed cultures by further passages in the susceptible cells. In nearly all cases, this method was more sensitive than the method of virus isolation from disrupted tumor or transformed cells. The sensitivity of this method was further increased by immunization of mice (for the PV test) or Wistar rats (for the SV40 test) with the mixed cells, followed by determination of serum levels of virus-specific antibodies. Using this method, PV was isolated from 1 mouse tumor which had been considered free of PV for 13 in vivo passages.

69-1856 VARIOUS ANTIBODY HOLDING STATUS AGAINST VIRUSES IN Cercopithecus aethiops AND Macaca irus. II. THE PRESENCE OF NEUTRALIZING ANTIBODY AGAINST HERPES VIRUS, ECHO VIRUS AND SIMIAN VIRUS 40. (E.) Nagashima, T. (Kitasato Inst., Tsurumi, Japan), M. Takada, Y. Yamane, Y. Ohwada and S. Kasahara. Kitasato Arch. Exp. Med. 40(1-4):45-56, 1967.

Sera collected from African green monkeys (Cercopithecus aethiops, imported from several nations of Africa) and cynomolgus monkeys (Macaca irus, imported from Vietnam, Malaysia, the Philippines or Thailand) were examined. Neutralizing antibodies against herpes simplex and ECHO viruses were found in 65.1% and 0.67%, resp., of the sera of C. aethiops origin, and in 69.9% and 0%, resp., of the sera of M. irus origin. None of the sera of C. aethiops origin and 15/120 sera (12.5%) of M. irus origin showed neutralizing antibodies against SV40; the only sera with SV40 antibodies were obtained from animals captured in the Mekong Delta of South Vietnam. The presence of herpes simplex and SV40 antibodies was not related to the season of arrival in the authors' laboratory, the duration between the animals' arrival and blood collection, or the sex or body wt. of the animals.

69-1857 ANTI-SV-40 COMPLEMENT-FIXING ANTIBODIES IN THE SERUM OF CHILDREN. (E.) Nigro, N. (U. Turin, Italy), L. Benso, M. Rosa-Brunet. Panminerva Med. 10(10):388-395, 1968.

Complement-fixing (CF) antibodies against SV40 were found in sera from 22/51 hospitalized and 12/12 healthy infants and children (age 20 days-12 yr.); the titers ranged from 1:32 to 1:128 in 23/34 children. A definite age relationship was evident: these antibodies were found in sera from 32/33 children over 2 and only 2/29 children under 2 yr. of age. All of the children over 2 yr. of age had received 5 doses of the Sabin polio vaccine. The presence or absence of CF antibodies against SV40 was not related to the disease leading to hospitalization (9 children had virus diseases; none had malignant diseases), or to the presence or absence of CF antibodies to a wide variety of other viruses (not including poliovirus), Mycoplasma pneumoniae or Toxoplasma. CF antibodies against SV40 were also found in sera from 14/15 healthy adults, including 10/10 adults living with Sabin-vaccinated children. Mean antibody titers were somewhat lower in the adults than in the children over 2 yr. of age.

69-1858 SPECIFIC ANTIGENS OF TUMOR CELLS PRODUCED BY SMALL DNA-CONTAINING ONCOGENIC VIRUSES. (Jap.) Shimojo, H. (Nat. Inst. Health Japan, Tokyo). Saishin Igaku 23(3):492-500, 1968.

In SV40-infected cells, T antigen formation (TAF) was more resistant to UV irradiation than plaque formation (PF), indicating that the target containing the information for TAF is smaller than that carrying the information for PF, and that the information for TAF forms only a part of the SV40 genome. In cells infected with adenovirus type 12 (AV-12), however, TAF and PF were equally sensitive to UV irradiation. The tumor-inducing capacity of AV-12 in hamsters, however, was not reduced as much by UV irradiation as had been expected from the studies of TAF and PF, and the tumor cells in these animals contained T antigen. It is suggested that the T antigen genome in AV-12 can be expressed in AV-12-induced tumors even if the integrity of the virus genome is destroyed, although TAF in the infected cells occurs only in the presence of the entire AV-12 genome.

69-1859 CYTOGENETIC STUDY OF TWO TUMOR LINES INDUCED IN THE GOLDEN HAMSTER BY SV_{40} VIRUS. (E.) Nachtigal, M. (Oncol. Inst., Bucharest), A. Lungeanu, S. Nachtigal and I. Aderca. Rev. Roum. D'Inframicrobiol. 5(2): 119-127, 1968.

Chromosome morphology was studied in 2 tumors induced in 5-7-day-old golden hamsters (1 male, 1 female) by s.c. inoc. of SV40, and in the tumor lines derived from these tumors by serial transplantation into adult hamsters (recipients of the first transfer were of the opposite sex from the donor; later passages were made in recipients of either sex). Neither tumor line showed a stable stem cell line. The primary tumor cells showed a wide range of chromosome numbers; in the first or second transplant generations, hypertriploid or hypotetraploid cells predominated. Many tumor cells showed a preferential increase in the number of X, B10 and E20 chromosomes, with a decrease in the number of D16-19 chromosomes. Studies using the X chromosome as a marker demonstrated the transplantability of the diploid cells for 1 transfer generation. Some tumors derived from 1 of the primary tumors showed cells that had originated in the recipient animals; the high proportion of chromosomal aberrations (particularly dicentrics) in these metaphases suggested the incorporation of at least part of the SV40 genome into the cells. It is also suggested that this method of tumor transplantation induced immune tolerance to SV40-infected cells in the adult recipients of the SV40-induced tumors.

69-1860 INDUCTION OF CELLULAR mRNA SYNTHESIS IN BSC-1 CELLS INFECTED BY SV40. (E.) Oda, K. (Salk Inst. Biol. Studies, San Diego, Calif.) and R. Dulbecco. Virology 35(3):439-444, 1968.

In SV40-infected monolayer cultures of BSC-1 (African green monkey kidney) cells, labeled with ^{3}H-uridine at different intervals after infection, the rate of cellular messenger RNA (mRNA) synthesis increased markedly beginning at 24 hr. after infection, while cellular mRNA synthesis in mock-infected cultures progressively declined. The rate of synthesis of viral DNA, virus-specific thymidine kinase and SV40 T antigen began to rise at the same time, indicating that the induction of mRNA synthesis might be the consequence of the expression of an "early" viral gene. Cellular mRNA was heterogeneous in size, probably resulting from a size variation of the messengers. Synthesis of ribosomal and transfer RNA was not stimulated (in fact, it declined somewhat with the age of the culture); degradation of the RNA of old ribosomes seemed to be more rapid after SV40 infection.

69-1861 EFFECT OF ACTINOMYCIN-D ON DNA SYNTHESIS IN AFRICAN GREEN MONKEY

KIDNEY CULTURES UNINFECTED AND INFECTED WITH SV40. (E.) Kato, K. (Nat. Inst. Health, Tokyo). Jap. J. Microbiol. 12(3):356-360, 1968.

Patterns of DNA synthesis were studied (using ^{3}H-thymidine uptake patterns) in primary or secondary monolayers of GMK cells exposed to SV40 for 2 hr. prior to the addition of actinomycin D (AD; 0.1-2.0 μg/ml). Normal cellular DNA synthesis was much more sensitive to AD than SV40 multiplication, but cellular DNA synthesis was induced by SV40 (prior to the replication of viral DNA), even in the presence of AD at conc. that inhibited normal cellular DNA synthesis. SV40-specific T antigens always appeared before the induction of DNA synthesis began, in infected cultures exposed to a conc. of AD (0.1 μg/ml) that had little effect on virus production. The DNA-synthesizing cells were among those producing the virus-specific T antigen. Sedimentation profiles of DNA from infected cells exposed to AD (0.1 μg/ml) suggested that 75-85% of the DNA labeled in the early stages (19-27 hr. after infection) was SV40-induced cellular DNA, whereas 50-60% of the DNA labeled in the later stages (43-51 hr. after infection) was SV40 DNA. It is suggested that the different AD sensitivities of the cellular and viral DNA's are related to the guanine contents of these DNA's.

69-1862 THE TRANSCRIPTION OF THE SV40 GENOME IN PRODUCTIVELY INFECTED AND TRANSFORMED CELLS. (E.) Sauer, G. (German Cancer Res. Ctr., Heidelberg, Germany) and J. R. Kidwai. Proc. Nat. Acad. Sci. USA 61(4):1256-1263, 1968.

The messenger RNA (mRNA) of SV40 was studied by the DNA-RNA hybridization method in productively infected CV-1 monkey kidney cells and in 3 virus-free transformed cell lines (3T3 mouse embryo fibroblasts and 2 strains of GMK monkey kidney cells). All transformed cells showed fewer sequences of SV40 mRNA than during a productive cycle of SV40 infection. In the transformed 3T3 and GMK cells, 40% and about 80%, resp., of the SV40 DNA sequences present in late SV40 mRNA (synthesized after the onset of viral DNA replication) were transcribed. In competition experiments, RNA from transformed 3T3 cells inhibited the hybridization of late SV40 mRNA by 40%. It is concluded that the functions of the SV40 genome are apparently regulated at the level of transcription, and that transformed cells copy different portions of the SV40 genome, depending on the species of the cells.

69-1863 DEMONSTRATION OF A SPECIFIC "REPRESSOR" IN CELLS OF DIFFERENT SPECIES TRANSFORMED BY SV40 VIRUS. (Fr.) Cassingena, R. (Lab. Virol., I.R.S.C., Villejuif, France) and P. Tournier. C.R. Acad. Sci. [D] (Paris) 267(25):2251-2254, 1968.

In SV40-infected BSC-1 cells, extracts from 5 SV40-transformed cell lines (3 hamster, 1 mouse, 1 cat) inhibited SV40 multiplication, but only in the presence of poly-L-lysine (which enhanced the permeability of the BSC-1 cells). Extracts of 11 other cell cultures derived from 4 species (hamster, mouse, monkey or cat), including 1 monkey cell line transformed by an irradiated adenovirus type 7-SV40 hybrid, 2 spontaneously transformed cell lines (of hamster or mouse origin), and 3 hamster cell lines transformed by other means (3-methylcholanthrene, adenovirus type 12 or polyoma virus), did not inhibit SV40 multiplication under any of the conditions studied. The SV40-specificity of this "repressor" substance from SV40-transformed cells was confirmed by its inability to inhibit the multiplication of herpes, vaccinia and polio viruses. The repressor substance, which did not correspond either to the T antigen of SV40 or to thymidine kinase, was identified as a protein by its sensitivity to heating and trypsin (it was not inactivated by DNase or RNase).

69-1864 USE OF MIXED HEMAGGLUTINATION TECHNIQUE IN DETECTION OF VIRUS-INDUCED ANTIGEN(S) ON SV40-TRANSFORMED CELL SURFACE. (E.) Häyry, P. (Wistar Inst. Anat. Bio., Philadelphia, Pa.) and V. Defendi. Virology 36(2):317-321, 1968.

Antisera obtained by immunizing adult male hamsters with living SV40-transformed cells of human origin (WI8Va2), living, irradiated SV40-transformed cells of hamster origin (H65-90B), and purified SV40, were tested against 17 hamster and mouse cell lines transformed either spontaneously or by different oncogenic viruses. The indicator consisted of sheep RBC (SRBC) coated with amboceptor (anti-SRBC hamster serum and rabbit anti-hamster γ-globulin). The antisera gave positive "mixed hemagglutination" (MHA) reactions with all cell lines transformed by SV40 or LLE46 (SV40-adenovirus type 7 hybrid), but not with primary hamster embryo cultures or with cell lines transformed either spontaneously, by polyoma virus, or by the RSV-RAV50 strain of Rous sarcoma virus. It is concluded that the MHA method is a specific, sensitive (more so than the surface immunofluorescence test) method for the detection of a new antigen on the surface of SV40- or LLE46-transformed cells. The possibility that the antigen is identical with the transplantation antigen is discussed.

69-1865 THYMIDINE KINASE ACTIVITY IN HUMAN AMNION CELL CULTURES INFECTED WITH SHOPE FIBROMA VIRUS. (E.) Barbanti-Brodano, G. (U. Bologna, Italy), M. Portolani, A. Bernardini, F. Stirpe, A. Mannini-Palenzona and M. La Placa. J. Gen. Virol. 3(3):471-474, 1968.

In human amnion cell cultures infected with Shope fibroma virus (SFV; doses causing the formation of inclusions in 1-1.5% of the cells by 48 hr. after infection), changes in thymidine kinase activity paralleled the development of new SFV inclusions. It is suggested that the higher thymidine kinase activity of SFV-infected cells depended on the synthesis of a virus-induced enzyme.

69-1866 ELECTRON MICROSCOPIC OBSERVATIONS ON HERPES-TYPE VIRUS-RELATED STRUCTURES IN THE FROG RENAL ADENOCARCINOMA. (E.) Stackpole, C. W. (Tulane U., New Orleans, La.) and M. Mizell. *Virology* 36(1):63-72, 1968.

Herpes-type virus (HTV) particles were observed in 80-90% of cells of the Lucké frog (*Rana pipiens*) kidney adenocarcinoma. The nuclei of the virus-infected cells contained double-shelled spherical particles (55 mμ in diameter; inner shell, 28 mμ in diameter), associated with the larger (100 mμ) virus particles and with tubular structures of varying diameters (35, 65 and 95 mμ) and 5-6 μ long. The spherical particles gave rise to the 35-mμ tubules, which subsequently served as cores for the 65-mμ tubules. In partially degenerated nuclei, the 65-mμ tubules were often coated with a finely granular material (resulting in a 95 mμ diameter); the capsids of adjacent virus particles were similarly coated. Capsomeres similar to those of the HTV capsids formed the outer sheath of the larger tubules, indicating a relationship between the 2 types of particles. The large tubules with double-sheathed cores, the spherical particles and the internal double-shelled structures of the immature virus particles were also similar. Electron microscopy studies of herpes-type virus development in eyechamber tumor transplants revealed that the spherical particles appear in infected nuclei about 2 weeks after virus production is initiated and increase in number as infection proceeds. The 35-mμ tubules appear when large aggregates of particles are present and the 65-mμ tubules shortly afterwards. It is suggested that the spherical particles and tubular forms are aberrant herpes-type virus-related structures produced during virus replication within the tumor cells.

69-1867 STUDIES ON THE ULTRASTRUCTURE AND ETIOLOGY OF MAST CELL TUMORS OF DOGS. (Ger.) Weiss, E. (U. Munich, Germany), R. Rudolph and N. Deutschländer. *Path. Vet. (Basel)* 5(3):199-211, 1968.

Electron microscopic examination of mast cell tumors from 3 dogs revealed that the morphology of the cytoplasm and cell surface varies according to the maturity and functional condition of the cell. The mature tumor cells resembled normal tissue mast cells; immature cells showed large amounts of well-developed ergastoplasm, an extended Golgi apparatus, a large number of free ribosomes, hypertrophic nucleoli, finely dispersed chromatin, complex cytoplasmic membranes and folded nuclear membranes. Five stages of maturation of the characteristic granules are described. During granule synthesis, signs of increased cell activity were seen. Release of substrate may have resulted from dissolution of granules. Intranuclear particles (250-300 Å) resembling a small DNA-containing virus were seen in cells from 1 tumor.

69-1868 IMMUNIZATION OF EXPERIMENTAL ANIMALS WITH VACCINES PRODUCED IN KNOWN ONCOGENIC CELL LINES. (E.) Hull, R. N. (Lilly Res. Lab., Indianapolis, Ind.). *Nat. Cancer Inst. Monogr.* 29:503-513, 1968.

The LLC-WRC$_{256}$ cell line, a virus-free cell line derived from the Walker 256 (W-256) rat carcinosarcoma, induced tumors of the W-256 type after s.c. inoc. in 100% of susceptible rats (1-2-day-old white rats). No tumors of the W-256 type developed in susceptible rats inoc. with formalin- or merthiolate-treated LLC-WRC$_{256}$ cells, or with an inactivated pseudorabies virus vaccine prepared using these cells. Some rats in each of these groups developed benign mammary tumors (apparently unrelated to the inoc. cells), and 4/78 rats inoc. with the inactivated vaccine developed fibrosarcomas (3) or a lymphoma (1). The NCTC 1742 cell line (of C3H mouse origin) induced sarcomas at the site of i.m. inoc. in about 38% of susceptible mice (weanling inbred C3H mice) after 42 wk. of observation. This cell line contained Type C virus particles. When this cell line was used to prepare an inactivated herpes simplex virus vaccine, susceptible mice developed no tumors after 42 wk. of observation.

69-1869 THE INDUCTION AND TRANSPLANTATION OF BRAIN TUMORS IN NEONATE BEAGLES. (E.) Wodinsky, I. (Arthur D. Little, Inc., Cambridge, Mass.), C. J. Kensler and D. P. Rall. *Proc. Amer. Ass. Cancer Res.* 10:99, 1969.

69-1870 NATURAL ACQUISITION OF ANTIBODIES TO RSV-RAV1. (E.) Sigel, M. M. (U. Miami Sch. Med., Fla.), R. A. Fugmann, J. A. Jensen, R. L. Stolfi, W. J. Russell and M. Dorsey, Jr. *Proc. Amer. Ass. Cancer Res.* 10:81, 1969.

69-1871 PROGESTERONE AND TUMOR SUSCEPTIBILITY IN MACAQUE MONKEYS. (E.) Munroe, J. S. (New York U. Med. Ctr., N.Y.) and T. Kung. *Proc. Amer. Ass. Cancer Res.* 10:62, 1969.

69-1872 VIRUS-LIKE PARTICLES IN CULTURED MURINE EPENDYMOBLASTOMA CELLS. (E.) Ames, R. P. (Roosevelt Hosp., New York, N.Y.) and R. C. Rubin. *Proc. Amer. Ass. Cancer Res.* 10:3, 1969.

69-1873 STUDIES ON PROTEIN COMPONENTS OF A-PARTICLES FROM A MOUSE MYELOMA. (E.) Wivel, N. A. (NCI, Bethesda, Md.), E. L. Kuff and K. K. Lueders. *Proc. Amer. Ass. Cancer Res.* 10:99, 1969.

69-1874 COMPARATIVE STUDIES OF LEUKEMIA AND SOLID TUMORS OF ANIMALS AND MAN BY MIXED HEMADSORPTION REACTION. (E.) Maruyama, K. (U. Texas M.D. Anderson Hosp., Houston), L. Dmochowski and M. P. McGehee. *Proc. Amer. Ass. Cancer Res.* 10:55, 1969.

69-1875 THE TUMORIGENIC AND LEUKEMOGENIC ACTIVITY OF A MOUSE TISSUE CULTURE CELL LINE CHRONICALLY INFECTED WITH MURINE LEUKEMIA VIRUSES. (E.) Mayyasi, S. A. (Chas. Pfizer & Co., Inc., Maywood, N. J.), L. Bulfone, H. Foster, G. Shibley and P. H. Aldenderfer. *Proc. Amer. Ass. Cancer Res.* 10:56, 1969.

69-1876 GROWTH RATE *IN VIVO* OF LEUKEMIA VIRUS CARRIER NEOPLASTIC CELLS AFTER SUPER-INFECTION WITH VIRUSES. (E.) Sinkovics, J. G. (U. Texas M.D. Anderson Hosp., Houston). *Proc. Amer. Ass. Cancer Res.* 10:82, 1969.

69-1877 BIOCHEMICAL STUDIES OF NORMAL AND FRIEND LEUKEMIA VIRUS (FLV) INFECTED MOUSE SPLEEN. (E.) Munson, B. (Roswell Park Med. Inst., Springville, N.Y.), T. Bardos and J. Ambrus. *Proc. Amer. Ass. Cancer Res.* 10:63, 1969.

69-1878 SUPPRESSION OF FRIEND LEUKEMIA VIRUS INFECTION IN DBA/2 MICE BY STATOLON AND ESTABLISHMENT OF A LATENT INFECTION. (E.) Wheelock, E. F. (Case Western Reserve U., Cleveland, Ohio) and N. L. Caroline. *Proc. Amer. Ass. Cancer Res.* 10:99, 1969.

69-1879 SEPARATION OF MEMBERS OF THE FRIEND VIRUS COMPLEX BY SUCROSE GRADIENT CENTRIFUGATION. (E.) Steeves, R. A. (Roswell Park Mem. Inst., Buffalo, N. Y.) and E. A. Mirand. *Proc. Amer. Ass. Cancer Res.* 10:86, 1969.

69-1880 AN ASSAY METHOD FOR TARGET CELLS OF FRIEND SPLEEN FOCUS-FORMING VIRUS. (E.) Thomson, S. (Roswell Park Mem. Inst., Buffalo, N. Y.). *Proc. Amer. Ass. Cancer Res.* 10:93, 1969.

69-1881 INTERACTION OF ONCOGENIC AND NON-ONCOGENIC VIRUSES WITH FRIEND LEUKEMIA VIRUS. (E.) Spahn, G. J. (Microbiol. Ass., Inc., Walkersville, Md.). *Proc. Amer. Ass. Cancer Res.* 10:85, 1969.

69-1882 EFFECT OF MURINE ONCOGENIC VIRUSES ON SERUM COPPER LEVELS. (E.) Pienta, R. J. (U. Texas M.D. Anderson Hosp., Houston), C. F. Tessmer and F. B. Thomas. *Proc. Amer. Ass. Cancer Res.* 10:69, 1969.

69-1883 LYTIC ACTIVITY OF PROGENY VIRUS FROM MSV (M) PRODUCING MOUSE SPLEEN CELLS CO-INFECTED WITH GUAROA VIRUS. (E.) Woods, W. A. (NCI, Bethesda, Md.) and J. F. Schulman. *Proc. Amer. Ass. Cancer Res.* 10:100, 1969.

69-1884 INCREASED TUMORIGENESIS OF MURINE SARCOMA VIRUS (MOLONEY) IN MICE BY CO-INFECTION WITH A NON-ONCOGENIC ARBOVIRUS. (E.) Turner, W. (NCI, Bethesda, Md.), D. Scott and W. Gibson. *Proc. Amer. Ass. Cancer Res.* 10:94, 1969.

69-1885 ONCOGENICITY AND ANTIGENICITY OF KIRSTEN SARCOMA VIRUS (KSV)-INDUCED TUMORS IN C3H MICE. (E.) McCoy, J. (U. Washington, Seattle), A. Fefer, N. Geary, L. Mayer and W. Kirsten. *Proc. Amer. Ass. Cancer Res.* 10:56, 1969.

69-1886 BIOLOGIC CHARACTERISTICS OF THE FBJ OSTEOSARCOMA VIRUS. (E.) Levy, J. A. (NIH, Bethesda, Md.), J. W. Hartley, W. P. Rowe and R. J. Huebner. *Proc. Amer. Ass. Cancer Res.* 10:50, 1969.

69-1887 PATHOGENESIS OF VIRUS-INDUCED MURINE SARCOMA. (E.) Siegler, R. (New Eng. Deaconess Hosp., Boston, Mass.) and M. Federman. *Proc. Amer. Ass. Cancer. Res.* 10:81, 1969.

69-1888 STUDIES ON TUMORS INDUCED BY TWO ISOLATES OF MURINE SARCOMA VIRUS (HARVEY AND MOLONEY). (E.) Soehner, R. L. (U. Texas M.D. Anderson Hosp., Houston). *Proc. Amer. Ass. Cancer Res.* 10:85, 1969.

69-1889 RESCUE OF DEFECTIVE MOLONEY SARCOMA VIRUS (MSV) BY RADIATION LEUKEMIA VIRUS (RadLV). (E.) Lieberman, M. (Stanford U. Sch. Med., Calif.), A. Decleve and H. S. Kaplan. *Proc. Amer. Ass. Cancer Res.* 10:51, 1969.

69-1890 PHYSICAL AND BIOLOGICAL PROPERTIES OF THE MURINE SARCOMA VIRUS. (E.) Parkman, R. (NCI, Bethesda, Md.) and R. C. Ting. *Proc. Amer. Ass. Cancer Res.* 10:68, 1969.

69-1891 PHYSICAL AND BIOLOGICAL PROPERTIES OF COMPETENT AND DEFECTIVE STATES OF A MURINE SARCOMA (MOLONEY) VIRUS. (E.) O'Connor, T. E. (NCI, Bethesda, Md.). *Proc. Amer. Ass. Cancer Res.* 10:65, 1969.

69-1892 RETICULAR CELL, MAMMARY, AND PITUITARY TUMORS IN AGED 4-WAY CROSSED HYBRID MICE. (E.) Poel, W. E. (U. Pittsburgh, Pa.), D. Stanton and M. Frickanisce. Proc. Amer. Ass. Cancer Res. 10:69, 1969.

69-1893 CONCURRENT DEVELOPMENT OF LEUKEMIA AND MAMMARY TUMORS IN MICE. (E.) Nielsen, A. H. (U. Kansas Sch. Med., Kansas City) and A. A. Werder. Proc. Amer. Ass. Cancer Res. 10:65, 1969.

69-1894 VIRUS-LIKE PARTICLES IN BOWEN'S DISEASE. (E.) Nordquist, R. E. (U. Oklahoma Sch. Med., Oklahoma City) and R. L. Olson. Proc. Amer. Ass. Cancer Res. 10:65, 1969.

69-1895 STUDIES ON SUBMICROSCOPIC STRUCTURE OF HUMAN BREAST CANCER. (E.) Seman, G. (U. Texas M.D. Anderson Hosp., Houston). Proc. Amer. Ass. Cancer Res. 10:78, 1969.

69-1896 QUANTITATIVE STUDIES OF BLOOD-BORNE MTV BIOACTIVITY. (E.) Moore, D. H. (Inst. Med. Res., Camden, N. J.). Proc. Amer. Ass. Cancer Res. 10:61, 1969.

69-1897 PHYSICAL CHARACTERIZATION OF THE MAMMARY TUMOR AGENT. (E.) Miroff, G. (Union Coll., Schenectady, N. Y.) and H. V. Lamberson. Proc. Amer. Ass. Cancer Res. 10:59, 1969.

69-1898 ON THE EQUILIBRIUM SEDIMENTATION OF THE MOUSE MAMMARY TUMOR VIRUS (MTV). (E.) Manning, J. S. (U. California, Berkeley). Proc. Amer. Ass. Cancer Res. 10:54, 1969.

69-1899 IMMUNOASSAY OF MOUSE MAMMARY TUMOR VIRUS. (E.) Sibal, L. R. (NCI, Bethesda, Md.), W. T. Hall, W. F. Feller and H. E. Bond. Proc. Amer. Ass. Cancer Res. 10:81, 1969.

69-1900 BIOASSAY OF MOUSE MAMMARY TUMOR VIRUS (MTV). (E.) Ritter, R. (U. California, Berkeley), S. Haslam and S. Nandi. Proc. Amer. Ass. Cancer Res. 10:73, 1969.

69-1901 ATTACHMENT AND PENETRATION OF B PARTICLES IN NORMAL MOUSE EMBRYO CELLS. (E.) Sarkar, N. H. (Inst. Med. Res., Camden, N. J.) and E. Y. Lasfargues. Proc. Amer. Ass. Cancer Res. 10:75, 1969.

69-1902 PITUITARY HOMOGRAFTS AND SPONTANEOUS MAMMARY TUMORIGENESIS IN THE RAT. (E.) Welsch, C. W. (Michigan State U., East Lansing), T. W. Jenkins and J. Meites. Proc. Amer. Ass. Cancer Res. 10:98, 1969.

69-1903 SUBMICROSCOPIC FIBROUS COMPLEXES IN ADENOVIRUS INFECTED AND TRANSFORMED CELLS. (E.) Stich, H. F. (U. British Columbia, Vancouver, Canada) and D. S. Yohn. Proc. Amer. Ass. Cancer Res. 10:88, 1969.

69-1904 SYNGENEIC SKIN REJECTION INDUCED IN HAMSTERS BY ADENOVIRUS ONCOGENESIS. (E.) Meeker, W. R., Jr. (Roswell Park Mem. Inst., Buffalo, N. Y.) and D. S. Yohn. Proc. Amer. Ass. Cancer Res. 10:57, 1969.

69-1905 RELATIONSHIP BETWEEN POTENTIATION OF H-1 BY ADENOVIRUS 12 AND H-1 INTERFERENCE WITH GROWTH OF "HELPER" ADENOVIRUS. (E.) Ledinko, N. (Putnam Mem. Hosp. Inst. Med. Res., Bennington, Ver.) and M. S. Hopkins. Proc. Amer. Ass. Cancer Res. 10:49, 1969.

69-1906 DETECTION OF A VIRUS IN A HUMAN NEPHROBLASTOMA CELL CULTURE. (E.) Smith, J. W. (U. Tennessee Med. Units, Memphis) and S. Dabrowski. Proc. Amer. Ass. Cancer Res. 10:83, 1969.

69-1907 TRANSFORMING ABILITY OF SV40 MUTANTS AND VIRUS "RESCUED" FROM TRANSFORMED CELLS. (E.) Takemoto, K. K. (NIH, Bethesda, Md.) and G. J. Todaro. Proc. Amer. Ass. Cancer Res. 10:91, 1969.

69-1908 THE MECHANISM OF RESISTANCE OF SV40-TRANSFORMED MONKEY AND HUMAN CELLS TO SV40. (E.) Swetly, P. (Wistar Inst., Philadelphia, Pa.) and H. Koprowski. Proc. Amer. Ass. Cancer Res. 10:91, 1969.

69-1909 HOST RESTRICTION OF SV40. (E.) Ozer, H. L. (NIH, Bethesda, Md.). Proc. Amer. Ass. Cancer Res. 10:67, 1969.

69-1910 TRANSPLANTATION IMMUNITY INDUCED BY UV-IRRADIATED SV40 AND DERIVED TUMORS. (E.) Defendi, V. (Wistar Inst., Philadelphia, Pa.) and F. Jensen. Proc. Amer. Ass. Cancer Res. 10:18, 1969.

69-1911 EFFECTS OF CULTURE CONDITIONS ON SV40 TRANSFORMED HUMAN AMNION CELLS. (E.) Fogh, J. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.) and E. V. Gaffney. Proc. Amer. Ass. Cancer Res. 10:26, 1969.

69-1912 VIRUS OR VIRUS-DERIVED AGGREGATES IN CELLS CULTURED FROM LEUKEMIA AND INFECTIOUS MONONUCLEOSIS. (E.) Uzman, B. G. (Child. Cancer Res. Found., Boston, Mass.) and A. Krishan. Proc. Amer. Ass. Cancer Res. 10:95, 1969.

69-1913 HERPES-TYPE VIRUS IN MAREK'S DISEASE TUMORS AND CELL CULTURE. (E.) Schidlovsky, G. (Chas. Pfizer & Co., Maywood, N. J.), S. Slattery, J. Leech, R. Mason and M. Ahmed. Proc. Amer. Ass. Cancer Res. 10:76, 1969.

69-1914 VIRUS-INDUCED HEMADSORPTION: DETECTION OF LEUKOVIRUS IN CULTURED HUMAN HEMATOPOIETIC CELL LINES. (E.) Minowada, J. (Roswell Park Mem. Inst., Buffalo, N. Y.), S. Shigeta, G. E. Moore and J. Matheisz. Proc. Amer. Ass. Cancer. Res. 10:59, 1969.

69-1915 SPECIFIC TUMOUR ANTIGEN INDUCED BY CHICK EMBRYO LETHAL ORPHAN (CELO) VIRUS. (E.) Potter, C. W. (U. Sheffield, England) and J. S. Oxford. J. Gen. Virol. 4(Pt.2):287-289, 1969.

69-1916 THE BINDING OF DNA POLYMERASE TO POLYOMA DNA. (E.) Pitts, J. D. (U. Glasgow, Scotland) and M. Fried. J. Gen. Virol. 4(Pt.2):189-201, 1969.

69-1917 EFFECT OF ADENO-ASSOCIATED VIRUSES ON THE ONCOGENICITY OF ADENOVIRUS 12. (E.) Kirschstein, R. (Div. Biol. Stan., Bethesda, Md.). Nat. Cancer Inst. Monogr. 29:433, 1968.

69-1918 CHEMOTHERAPEUTIC ASSAYS ON RAUSCHER VIRUS-INDUCED LEUKEMIA. (Ger.) Seidel, H. J. (Farbenfabriken Bayer AG, Wuppertal-Elberfeld, Germany) and E. Grundmann. Europ. J. Cancer 5(1):15-24, 1969. (13 references)

69-1919 DETECTION OF PERSISTENT INFECTIONS USING BIOPHYSICAL METHODS. (E.) Anderson, N. G. (Oak Ridge Nat. Lab., Tenn.). Nat. Cancer Inst. Monogr. 29:393-403, 1968.

69-1920 VIRAL ONCOGENESIS AND RESULTS OF INOCULATION OF NORMAL AND TRANSFORMED CELLS INTO NONHUMAN PRIMATES. (E.) Deinhardt, F. (U. Illinois Sch. Med., Chicago). Nat. Cancer Inst. Monogr. 29:327-331, 1968. (11 references)

69-1921 VIRAL ONCOGENESIS AND RESULTS OF INOCULATION OF NORMAL AND TRANSFORMED CELLS INTO NONHUMAN PRIMATES - DISCUSSION. (E.) Stevenson, R. E. (Union Carbide Corp., Tarrytown, N. Y.). Nat. Cancer Inst. Monogr. 29:333-336, 1968.

69-1922 VARIABLE SUSCEPTIBILITY OF HUMAN CELL STRAINS TO SV40 TRANSFORMATION. (E.) Todaro, G. J. (NCI, Bethesda, Md.). Nat. Cancer Inst. Monogr. 29:271-275, 1968.

69-1923 THE FINE STRUCTURE OF WOUND TUMOR VIRUS AND REOVIRUS. (E.) Streissle, G. (Thompson Inst. Plant Res., Yonkers, N Y.) and R. R. Granados. Arch. Ges. Virusforsch. 25(3-4):369-372, 1968.

See also abstract nos.: 1655,1656,1657,1658,1670,1671,1672,1673,1674,1676,1677,1678,1679,1680,1681, 1682,1683,1684,1685,1686,1687,1688,1689,1690,1706,1710

69-1924 MORBIDITY AND MORTALITY FROM MALIGNANT NEOPLASMS IN POLAND IN 1961 THROUGH 1964. (Pol.) Koszarowski, T. (Inst. Oncol., Warsaw), H. Gadomska and Z. Drożdżewska. Pol. Arch. Med. Wewnet. 41(2):205-213, 1968.

In 1961-1964 (inclusive), 142,538 new cancers were registered in Poland (about 57,000/yr.); the incidence/100,000 population was 120.7 in 1961, 113.8 in 1962, 115.4 in 1963 and 117.0 in 1964. This incidence was consistently higher in females than in males; about 60% of all new tumors were seen in females. Significant geographical variations (of unknown cause) and an urban-rural variation (attributed to better case reporting in cities) were noted. Morbidity and mortality rates/100,000 population for individual tumors are given for 1962-1964. The highest incidence rates in women were seen for cervix and breast cancer (31.3 and 16.1, resp., in 1964, with little change from 1962); stomach cancer was third (increasing from 13.1 in 1962 to 14.7 in 1964). The highest incidence rate in men was seen for stomach cancer (25.3 in 1964, with little change from 1962); lung cancer was second (increasing from 14.6 in 1962 to 17.4 in 1964, compared to 2.7 and 3.5, resp., in women) and skin cancer was third (6.9 in 1964, compared to 8.1 in women, with no significant change in women and a slight decrease since 1962 in men). From 1962 to 1964, cancer mortality rates/100,000 increased from 106.3 to 122.8 in men, and from 101.5 to 115.9 in women. The highest mortality rates in both men and women were from stomach cancer (39.1 and 24.7, resp., in 1964, increasing from 36.0 and 22.2, resp., in 1962). Lung cancer mortality increased from 1962 to 1964 in both men and women (18.0 to 23.6, and 4.3 to 4.6, resp.). The second highest mortality rate in women was from cancer of the bile ducts (14.9 in 1962, 16.7 in 1964, compared to 7.2 and 7.5, resp., in men). The cancer mortality rates/100,000 population were higher in urban areas than in rural areas (126.9 and 111.9, resp., in 1964), but mortality rates/1000 cancer pts. were higher in rural areas than in urban areas (629 and 446.4, resp., in 1964).

69-1925 SEASONAL VARIATIONS IN BIRTH-RATES OF CANCER PATIENTS. (E.) De Sauvage Nolting, W. J. J. (Slotaan 3011, Zeist, Netherlands). Int. J. Biometeor. 12(3):293-295, 1968.

The birth dates of cancer pts. from several nations in the Northern Hemisphere and in Australia, when corrected according to the monthly birth rates in these nations, showed a seasonal variation of about 7-12%. Cancer frequencies were highest in persons born during the winter (December-March in the Northern Hemisphere, about June-July in Australia) and lowest in those born during the summer. The seasonal pattern of birth dates was the same in cancer pts. born and living in the Northern Hemisphere, and in pts. born in the Northern Hemisphere who had moved to Australia. It is suggested that this seasonal variation in cancer incidence may reflect the maternal and/or embryonic responses to changes in the wavelength and intensity of sunlight, at the time of conception and during the early stages of embryonic development.

69-1926 CARCINOMA OF BILE DUCTS IN HUSBAND AND WIFE. (E.) McCarthy, C. F. (Roy. Infirm., Bristol, England) and H. J. Espiner. Gut 10(2):94-97, 1969.

A husband and wife (age 45 and 44, resp.; married for 25 yr.) with adenocarcinomas of the common hepatic duct and ampulla of Vater, resp. (both tumors are rare, especially in persons under 45), are described. The husband (who had smoked 30 cigarettes/day for nearly 30 yr.) died 4 mo. after the diagnosis of cancer; the wife (who smoked 10 cigarettes/day) developed jaundice 1 mo. after her husband's death. The only slightly unusual feature noted for both pts. was their habitual consumption of caraway seed cake; contamination of caraway seeds by Aspergillus flavus is described as remotely possible, but aflatoxin production is unlikely.

69-1927 EPIDEMIOLOGY OF BLADDER CANCER. (Jap.) Yoshida, O. (U. Kyoto Sch. Med., Japan), M. Miyakawa, T. Harada and K. Okada. Nippon Rinsho (Jap. J. Clin. Med.) 26(8): 1850-1854, 1968.

The relative risks of bladder cancer in smokers were studied in 192 pts. with bladder cancer (163 men, 29 women) and in 222 control subjects (163 men, 59 women). Of the male pts., 92% were smokers and 8% were non-smokers (compared to 77.3% and 22.7%, resp., in the male control group). Of the female pts., 37.9% were smokers and 62.1% were non-smokers (compared to 13.6% and 86.4%, resp., in the female control group). The relative risks of bladder cancer in male and female smokers were calculated to be 3.4 and 3.9, resp. When the male cancer pts. who smoked were compared to the male controls who smoked, the relative risk of bladder cancer in the heavy smokers was calculated to be 4.4. A graph of the steadily increasing age-adjusted bladder cancer mortality rates since 1955 is included; projection of this graph suggested that the bladder cancer mortality rates/100,000 population in Japan may be about 6.5 in males and 4.3 in females by 1985.

69-1928 THE RELATIONSHIP BETWEEN PULMONARY TUBERCULOSIS AND BRONCHOGENIC CARCINOMA.

A TOPOGRAPHIC STUDY. (E.) Snider, G. L. (Chicago Sch. Med., Ill.) and B. Placik. Amer. Rev. Resp. Dis. 99(2):229-236, 1969.

The relationship between bronchogenic carcinoma and pulmonary tuberculosis (TB) was studied in 130 pts. with cancer and TB and 184 cancer pts. without active TB. From these groups, 124 pairs were selected (matched for 5-yr. age group, sex and race); this matched series included 4 women (all white) and 244 men (white:Negro ratio of 4:1). Data on smoking habits were not available for all pts., but the 2 groups were assumed to be similar in this respect. The topographic distribution of the lung tumors was about the same in each group, suggesting that local factors resulting from pulmonary TB did not significantly affect the localization of bronchogenic carcinoma. In the total group of pts. with TB and cancer, TB had preceded the clinical signs of cancer by 6 mo. or more in 73/130 (56.2%); since 41/73 showed positive TB cultures within 6 mo. of the onset of cancer, it is suggested that the cancer may have reactivated the TB in some cases. Mycobacteria were cultured from secretions from 34 pts. of the control group (not fulfilling the diagnostic criteria for active TB); some pts. had atypical mycobacterial infections, and in other pts. the cancer may have caused ulceration of microscopic caseous foci, with shedding of a few tubercle bacilli.

69-1929 A MASS SURVEY STUDY OF TOKYO METROPOLITAN GOVERNMENT EMPLOYEES FOR PULMONARY CANCER. (Jap.) Kakita, S. (Tokyo Med. Coll., Japan). Nippon Kyobugeka Gakkai Zasshi (J. Jap. Ass. Thor. Surg.) 16(11):1144-1162, 1968.

A mass chest X-ray survey of Tokyo metropolitan government employees from 1953-1966 (inclusive) disclosed lung cancer in 93/838,396 employees (11.1/100,000), including 91/315,142 persons over 40 (28.9/100,000). The incidence/100,000 increased with age: 0.0 at age 15-29, 0.8 at age 30-39 (0.4 in all persons under 40), 6.4 at age 40-49, 29.8 at age 50-59, and 112.3 at age 60 and over. A 12-yr. survey (1953-1964) of an identical group of persons (45,403 in 1953; reduced to 30,489 in 1964) showed 75 cases of lung cancer, for an incidence of 245.99/100,000. A relationship between lung cancer and air pollution (chimney smoke) was demonstrated. Follow-up studies of these pts. led to the conclusion that chest X-rays should be performed twice each yr. to ensure early diagnosis.

69-1930 ASPECTS OF LUNG CANCER MORTALITY IN THE PROVINCE OF MANTUA IN THE FIVE-YEAR PERIOD 1961-1965. (It.) Rosolini, D. (Prov. Antitub. Soc., Mantua, Italy). Riv. Ist. Vac. Con. Pro. Antitub. 17(1):70-74, 1967.

In 1961-1965 (inclusive), 4024 cancer deaths were recorded in Mantua Province; 379/4025 (9.42%) died of lung cancer. Total cancer mortality rates/10,000 population in this province rose from 20.0 in 1961 to 22.1 in 1965; lung cancer mortality rose from 1.6/10,000 in 1961 to 2.2 in both 1964 and 1965 (compared to 2.5/10,000 in Venice in 1964-1965). In the last 3 yr. of this period, lung cancer accounted for over 10% of all cancer deaths (250/2457 deaths), compared to 9.6% of all cancer deaths in all of Italy and 12.7% in Lombardy (including Brescia). The male:female ratio in these 379 lung cancer pts. fluctuated from 4:1 to 10:1 during this 5-yr. period, with an av. of 6:1 (compared to 8:1 in Venice). The mean ages at death were lower in males than in females up to 1965, when the females were older than the males. The group of lung cancer pts. included 3 pts. in the 21-30 yr. age group (all females) and 6 in the 31-40 age group (5 males, 1 female). Lung cancer mortality rates increased steadily in females after age 40; in males, a peak was seen at age 61-70, followed by a decline.

69-1931 RADIOLOGICAL INVESTIGATION AND DIAGNOSIS OF PULMONARY CANCER. (It.) Rosolini, D. (Prov. Anti-Tuberc. Soc., Mantua, Italy). Riv. Ist. Vac. Con. Pro. Antituberc. 18(3):381-397, 1968.

In 1962-1966 (inclusive), 145,378 chest X-rays were performed in Mantua Province (82,210 in men, 63,618 in women); persons examined more than once returned at av. intervals of 20 mo. In these persons, the lung cancer incidence was 4.8/100,000 (in persons over 40, it was 31/100,000). During this same 5-yr. period, 424 pts. died of lung cancer in Mantua Province (15.22% of all cancer deaths, compared to 5.25% of all cancer deaths in 1946). The lung cancer mortality rate in Mantua in 1966 was 28/100,000 (compared to 25/100,000 in Lombardy in 1963-1964). Of the 424 pts. dying of lung cancer during this 5-yr. period, only 33 had undergone chest X-ray examination (in 1961-1965); 24/33 had been examined once, an av. of 40 mo. before death (lung cancer was found at the first examination in 2/24), 7/33 had been examined twice (at av. intervals of 65 and 33 mo., resp., before death), and 2/33 had been examined 3 times (at av. intervals of 79, 51 and 15 mo., resp., before death). Routine chest X-rays at intervals of no more than 1 yr. (perhaps at 6-mo. intervals) are recommended, particularly in men over 40.

69-1932 ROLE OF ENVIRONMENTAL FACTORS IN CANCER PRODUCTION. (Jap.) Tsuchiga, K. (Keio U., Tokyo). Keio Igaku (J. Keio Med. Soc.) 44(6):709-717, 1967.

In 375 pts. with stomach cancer and 126 with bladder cancer (and equal numbers of control subjects), the relative risks of these tumors in smokers (compared to non-smokers) were 1.00 and 2.60, resp. The relative risk of lung cancer (152 pts., 154 controls) in smokers was 3.47 (relative to non-smokers); in persons smoking 1-9, 10-19 and 20 or more cigarettes/day, this relative risk was 2.50, 2.67 and 5.88, resp. In men working in industries handling chromium or nickel, the lung cancer mortality rate in 1957-1959 was 22/415,171 employees, significantly higher than the expected value (10.75 deaths), but mortality rates from leukemia, stomach or liver cancer and other tumors were not significantly higher than expected. The lung cancer incidence in crane, hoist and construction machinery operators was also significantly above the expected level. A table showing the main causes of death in 1962, tabulated according to occupation, in Japanese males over 15 (age-adjusted for the total employed population in 1962), showed an increased stomach cancer mortality rate in farmers and fishermen (115.3), miners (164.3), and transportation and communication workers (174.6; the death rate for all occupations was expressed as 100).

69-1933 HIST [illegible] TYPES OF GASTRIC CARCINOMA IN HIGH- AND LOW-RISK AREAS. (E.)

Muñoz, N. (U. Valle Fac. Med., Cali, Colombia), P. Correa, C. Cuello and E. Dugue. Int. J. Cancer 3(6):809-818, 1968.

The Laurén classification system was applied to 322 stomach cancers obtained from 1 city of high stomach cancer incidence (Cali, Colombia) and 3 cities of low incidence (Cartagena or Barranquilla, Colombia, and Mexico City). Tumors of "intestinal-type" histology predominated in Cali, and tumors of "diffuse-type" histology in the 3 low-incidence areas (combined); the ratios of intestinal-type:diffuse-type tumors were 1.52:1 and 0.73:1, resp. A significant male excess was seen in the pts. with intestinal-type tumors (male:female ratios in Cali and the low-incidence cities were 2.7:1 and 2.4:1, resp.), but not in pts. with diffuse-type tumors (male:female ratios were 1.4:1 and 1.9:1, resp.). In Cali and the 3 low-incidence cities, the mean ages were significantly higher in pts. with intestinal-type tumors than in pts. with diffuse-type tumors. The frequency of intestinal metaplasia in the non-cancerous mucosa (evaluable in 56% of the 322 pts.) was significantly higher in pts. with intestinal-type tumors (84.8% in the Cali pts., 94.5% in the pts. from the low-incidence areas) than in pts. with diffuse-type tumors (54.1% and 48.9%, resp.). Further analysis of the data showed that most of the excess stomach cancer risk in Cali was attributable to an excess incidence of intestinal-type tumors. It is suggested that these 2 principal types of stomach cancer develop from different premalignant lesions.

69-1934 GASTRIC ULCER, DUODENAL ULCER AND GASTRIC CARCINOMA: A CASE-CONTROL STUDY OF CERTAIN SOCIAL AND ENVIRONMENTAL FACTORS. (E.)

Gillies, M. (Roy. Prince Alfred Hosp., Sydney, Australia) and A. Skyring. Med. J. Aust. 2(25):1132-1136, 1968.

Interviews designed to obtain information about more than 40 genetic and environmental factors (including socioeconomic and marital status, occupation, family histories of peptic ulcer, smoking, alcohol consumption, and consumption of drug preparations with or without aspirin) were obtained from 150 pts. with peptic ulcers (stomach in 100/150, duodenal in 50/150), 50 pts. with stomach cancer, and equal numbers of age- and sex-matched controls without histories or symptoms of upper g.i. disease (not excluding pts. taking analgesic or anti-inflammatory agents, with or without aspirin). The pts. with stomach cancer and duodenal ulcers did not differ from any of the control groups in any of the factors studied, although the pts. with stomach ulcers differed from the control groups in several parameters (including smoking, alcohol and aspirin consumption, family ulcer histories, and parameters indicating mental stress).

69-1935 EPIDEMIOLOGY OF LIVER CANCER. (Jap.)

Arima, M. (Natl. Cancer Inst. Hosp., Tokyo). Nippon Rinsho (Jap. J. Clin. Med.) 26(8):1833-1838, 1968.

Primary liver tumors were seen in 2076/106,992 pts. autopsied in Japan from 1958-1965 (inclusive); the incidence was about 1.7-2.2% of all autopsies/yr. The ratio of hepatomas to cholangiomas was 8:1; the male:female ratios in pts. with these tumors were 6:1 and 2:1, resp. Cirrhosis, usually of the Laennec type, was seen in about 63% of the males and 58% of the females with hepatoma; the incidence of cirrhosis was lower in pts. with cholangioma (especially in females). Ridit analysis suggested an increased relative risk of hepatoma (with or without cirrhosis) in persons eating meat or drinking alcoholic beverages every day. Analysis of data for 180 pts. with primary liver tumors indicated an over-all relative risk of about 4.5 in heavy smokers (over 30 cigarettes/day) and a somewhat lower relative risk (below 4.0) in ex-smokers. Positive family histories, obtained from 343 pts. with hepatoma (212 with and 131 without cirrhosis) and 37 with cholangioma, included family histories of liver cancer (with or without cirrhosis) in 9.9%, 4.6% and 5.4%, resp., other liver diseases in 10.8%, 9.2% and 5.4%, resp., and cancer of other organs in 22.6%, 20.6% and 24.3%, resp. Autopsy examination of the livers of 46 pts. previously treated with Thorotrast (radioactive $^{232}ThO_2$) showed cholangioma in 19/46 (79.2%), hepatoma and hemangioendothelioma in 5/46 each (20.8%) and liver cirrhosis in 13/46 (38.4%). The mean survival times after Thorotrast inj. in these 4 groups were 23, 28, 28 and 21 yr., resp.

69-1936 EPIDEMIOLOGY OF CANCER OF THE LARYNX. (Jap.) Kirikae, I. (U. Tokyo Sch. Med.). Nippon Rinsho (Jap. J. Clin. Med.) 26(8):1808-1811, 1968.

The relative risks of head and neck cancer in smokers (setting the values for non-smokers at 1.0) were 1.82 in males and 1.33 in females: 1.77 and 0.98, resp., for maxillary tumors, 2.04 and 1.12, resp., for mouth tumors, and 1.61 and 1.41, resp., for other head and neck tumors. However, in pts. with cancer of the larynx (440 men and 220 women with larynx cancer were studied), the relative risks in male and female smokers were 3.92 and 6.38, resp. In males, the relative risk of larynx cancer rose to 5.2 in men smoking 10-20 cigarettes/day, and remained about the same in men smoking over 21 cigarettes/day. In women, however, the relative risk increased sharply as cigarette consumption increased (4.9 at under 10 cigarettes/day, 14.0 at up to 21 cigarettes/day, 19.7 at over 20 cigarettes/day).

69-1937 RESULTS OF SCREENING FOR OTORHINOLARYNGOLOGIC CANCER. (Ger.) Faragó, L. (State Oncol. Inst., Budapest). Mschr. Ohrenheilk. 102(10):588-601, 1968.

Two screening studies disclosed malignant tumors of the upper respiratory tract in 20/22,697 persons (0.09%; larynx cancer in 11/20) and premalignant lesions in 765/22,697 (3.37%; oral cavity in 430, larynx in 310). In 1 study of labor union members and their families, upper respiratory lesions were found in 77/12,979 (0.57%): 61/6770 males (0.90%) and 14/6209 females (0.22%). The age range in these pts. was 10-80 yr. (av. 48.9 yr.); 65.33% were industrial workers. Only 16/77 (21.39%) were non-smokers; 42/77 (56.00%) were heavy smokers (21-60 cigarettes/day); 31/77 (41.33%) were non-drinkers, and 14/77 (18.18%) were heavy drinkers. The other study showed upper respiratory lesions in 691/9718 (7.11%) employees of 14 Hungarian factories. The incidence was 9.99% in males and 4.20% in females; the age range was 15-69 yr. (av. 41.3 yr.). The pt. group included 143/1357 male and 118/2503 female employees of 7 tobacco processing plants (10.54% and 4.71%, resp.), and 344/3514 male and 86/2344 female employees of 7 chemical and other factories (9.78% and 3.67%, resp.). Only 176/691 (25.47%) were non-smokers; 341/691 (49.34%) were heavy smokers; 335/691 (48.48%) were non-drinkers, and 78/691 (11.28%) were heavy drinkers. The relationship between heavy smoking, high alcohol consumption and occupational hazards (especially in combination), and malignant tumors or premalignant lesions of the upper respiratory tract (especially the larynx), is stressed. Interviews of 3473 persons disclosed family histories of cancer in 352/3287 (10.7%) healthy persons and 14/187 (7.52%) with upper respiratory lesions. The parents and grandparents (especially the mothers and grandmothers) were most frequently affected; the most frequently reported tumors in the relatives were cancer of the stomach, uterus, liver and lung.

69-1938 OBSERVATIONS ON CANCERS OF THE HEAD AND NECK REGION FROM THE STANDPOINT OF SOCIAL MEDICINE. (Jap.). Toyota, B. Jibiinkoka (Otolaryngology [Tokyo]) 40(8):571-575, 1968.

Head and neck tumors were found in 198/2442 pts. (8.4%) with cancer seen in Toyama Prefecture from 1961-1965 (inclusive). Cancer of the larynx was the most frequent tumor (53/198 = 25.2%), followed by tumors of the nose (19.1%), esophagus (18.2%), mouth (12.1%), thyroid (10.6%) and pharynx (7.6%). Of these pts., 55.6% lived in rural areas and 44.4% in urban areas (morbidity rates/100,000 are not stated). Etiologic factors are not discussed.

69-1939 TREATMENT OF MALIGNANT TUMORS OF MINOR SALIVARY GLANDS. (E.) Shumrick, D. A. (Cincinnati Gen. Hosp., Ohio). Arch. Otolaryng. (Chicago) 88(1):74-79, 1968.

The records of the University of Iowa Department of Otolaryngology and Maxillofacial Surgery disclosed 54 malignant tumors of the minor salivary glands from 1938-1966; 0.123% of all cancers, 1.24% of all head and neck tumors, and 13% of all tumors of salivary gland origin in the head and neck (University of Iowa Tumor Registry data). Of these tumors, 52% (28/54) were adenocarcinomas, 26% (11/54) were cylindromas, 16% (9/54) were mixed tumors (4 benign, 5 malignant), and 6% (3/54) were mucoepidermoid carcinomas. The age range was 11-85 yr. (av. 59 yr.), and the sex incidence was divided equally. The most frequent tumor sites were the soft or hard palate (38.9%), buccal mucosa (15.0%), nasopharynx or hypopharynx (12.7%) and maxillary sinus (11.0%).

69-1940 MALIGNANT MELANOMAS OF THE NASAL AND PARANASAL SINUS MUCOSA. (E.) Holdcraft, J. (Armed Forces Inst. Path., Washington, D. C.) and J. C. Gallagher. Ann. Otol. 78(1):5-20, 1969.

Through 1965, 39 primary malignant melanomas of the nasal and paranasal sinus mucosa were registered at the Armed Forces Institute of Pathology (AFIP): about 0.5% of all malignant tumors (6883 cases) and 3.6% of all tumors of the nasal and paranasal sinus mucosa (1029 cases) in the AFIP collection. A literature survey (28 references) disclosed 195 additional cases (6/195 were Negroes); several previous papers suggested that melanomas of the nasal and paranasal sinus mucosa comprise about 0.6-0.7% of all melanomas (2.5% in 1 study) and about 2-9% of all melanomas of the head and neck.

The AFIP group was 62% male (but most cases reported to the AFIP are males); 6/39 (16%) were Negroes and 3/39 were Orientals. When these 39 cases were added to 97 previously recorded cases, the relatively late onset of this tumor (by comparison to cutaneous melanoma) was demonstrated; only 20% of these pts. were under 50 yr. old at diagnosis. The AFIP series included the 2 youngest known cases of this tumor (17 and 22 yr. old).

69-1941 LIPOSARCOMA OF THE NECK. (E.) Stroller, F. M. (13535 Detroit, Lakewood, Ohio) and D. G. Davies. Arch. Otolaryng. (Chicago) 88(4):419-422, 1968.

From 1958-1965, only 4 cases of liposarcoma of the head and neck were found in southern England (with a population of 8.5 million); 1 such case is described.

69-1942 AMELOBLASTOMA IN IBADAN, NIGERIA. (E.) Akinosi, J. O. (U. Ibadan, Nigeria) and A. O. Williams. Oral Surg. 27(2): 257-265, 1969.

The 1957-1966 records of the University College Hospital (Ibadan) showed about 300 tumors of the salivary glands, oral cavity, jaws and maxillary antra. Ameloblastomas were seen in 76/300 (25%), accounting for 1.3% of the tumors reported during this 10-yr. period (about the same frequency as in other parts of the world). The age range in these pts. was 8 mo.-62 yr. (av. 31.2 yr.); the male:female ratio was about 4:3. The pts. were of varying ethnic backgrounds and came from all parts of Nigeria (most from Western Nigeria, in areas of relatively easy access to this hospital); no conclusions as to the geographical distribution of this tumor could be drawn. No significant racial difference in the over-all incidence of ameloblastoma was noted (by comparison to previously reported studies of white pts. in Europe and the U.S.), but a significant difference in the distribution of these tumors was found. Maxillary ameloblastomas were seen in 12% of the Nigerian group (about the same as in white pts.), but 74% of the mandibular tumors in the Nigerians involved the symphysis and premolar area (compared to less than 20% in white pts.), and 20% involved the anterior mandible. None of these Nigerian pts. showed signs of rickets or severe malnutrition. No local customs or habits affecting the anterior mandible were discovered. A traumatic etiology was considered possible in 1 pt. It is suggested that the high frequency in Nigeria of severe oral sepsis and calculus deposits around the mandibular incisors may be of etiologic significance.

69-1943 PRELIMINARY STUDIES ON GOITER AND TUMORS OF THE THYROID APPEARING IN THE INHABITANTS OF THE HIGH PLATEAUS OF MADAGASCAR. 139 CASES. (Fr.) Andrianjatovo, J., Y. Husson and P. Pialoux. Ann. Otolaryng. (Paris) 86(1-2):69-78, 1969.

Environmental factors favoring a high incidence of goiter and thyroid tumors in the high plateaus of Madagascar include an iodine-poor soil of volcanic origin and a high background radioactivity, as well as an iodine-poor diet (consisting primarily of rice, with legumes used as meat substitutes). In 1964-1967, 139 pts. with thyroid enlargement but without symptoms of hypothyroidism were seen. The group included 13 males and 126 females (85/126 had at least 2 children); 23/139 (5 males, 18 females) were under 15. Diffuse hyperplastic goiter was noted in 55/139, clinically apparent cancer in 4/139, solitary nodules in 16/139 and diffuse multinodular or colloid goiter in 64/139. Malignant tumors were seen in 2/16 (12.5%) with isolated nodules and 11/64 (17%) with diffuse goiter. Thyroid cancer was seen in 2/8 (25%) of the adult male pts. It is concluded that apparently benign goiter has a certain malignant potential, especially in adult males.

69-1944 FIBROUS XANTHOMA OF SYNOVIUM (GIANT-CELL TUMOR OF TENDON SHEATH, PIGMENTED NODULAR SYNOVITIS). A STUDY OF ONE HUNDRED AND EIGHTEEN CASES. (E.) Jones, F. E. (U. Minnesota Mayo Grad. Sch. Med., Rochester), E. H. Soule and M. B. Coventry. J. Bone Joint Surg. [Amer.] 51-A(1):76-86, 1969.

The Mayo Clinic records for 1954-1963 (inclusive) revealed 117 pts. with 118 fibrous xanthomas of the synovium (excluding pts. with tuberous, multiple or diabetic xanthomas); 91/118 tumors involved the fingers and thumb (especially the dorsal surfaces of the distal joints of the fingers), 14 were seen in the knee joint, 1 in the hip joint, and 4 each in the hand, wrist or foot. Clinical or X-ray signs of injuries or (in 45% of the involved joints) degenerative joint diseases, involving the affected joints or the joint nearest the tumor, were found in 53/117 pts. Females predominated, with a female:male ratio of 3:2; most pts. (over 67% of the group) were over 50 (age range, 14-77 yr.). It is suggested that fibrous xanthomas of the synovium, like the histologically similar pigmented villonodular synovitis, originate from the histiocyte. Metaplasia may occur under certain conditions. These lesions are usually benign, but they may become locally aggressive (17% of 96 evaluated tumors recurred at least once after excision) and may occasionally form metastasizing malignant tumors.

69-1945 A STUDY OF MALIGNANT TUMOUR OF SYNOVIAL ORIGIN. (E.) Cooray, G. H. (U. Ceylon, Colombo) and M. Nagendra. Ceylon Med. J. 13(2):69-74, 1968.

Examination of the records of the University of Ceylon Department of Pathology for 1955-1965 (inclusive) disclosed 7687 malignant tumors; 66/7687 (0.85%) were malignant synoviomas, predominantly involving the legs (40/66 = 60.6%) or upper extremities (22/66 = 33.3%; arm in 11/22, shoulder girdle in 6/22, hand in 4/22). Males and females were about equally affected. The largest numbers of pts. were 19-29 and 49-59 yr. old; relatively few females were in the youngest and oldest age groups. Since most pts. came from Colombo and its suburbs (communities of unknown racial composition), no definite conclusions could be drawn as to the racial or ethnic distribution of this tumor, but 55/66 pts. (83.3%) were Sinhalese. A previous study showed a higher incidence of malignant synoviomas in Ceylon than in the U.S. (12% and 3%, resp., of all connective tissue tumors), but the proportion of giant cell tumors in this Ceylonese group (8/66 tumors = 12.1%) was about the same as in other studies. The predominantly fibrous tumors were less malignant than the more cellular tumors.

69-1946 STATISTICAL REEVALUATION OF PINEALOMA AND RELATED TUMORS IN JAPAN. (E.) Araki, C. (Kyoto U. Sch. Med., Japan) and S. Matsumoto. J. Neurosurg. 30(2):146-149, 1969.

Autopsy records for 1958-1964, collected from all university clinics and principal large hospitals in Japan, showed primary intracranial tumors in 1977/87,395 cases; this incidence (2.2%) was comparably to the incidence in other nations. Comparison of the 1802 histologically verified intracranial tumors from this series, with 579 similar tumors in 4 autopsy series from other nations (previously reported), showed about the same relative proportions of gliomas (59.0% and 62.9%, resp.), meningiomas (11.1% and 14.3%, resp.), neurinomas (6.6% and 5.5%, resp.) and most other tumor types. The relative proportions of pinealomas, teratomas and craniopharyngiomas in the Japanese series (5.4%, 3.4% and 5.8%, resp. = 97/1802, 62/1802 and 105/1802 verified intracranial tumors, resp.), however, were significantly higher than in the other 4 series (0.7%, 0.2% and 0.8%, resp.). The 136 pineal tumors (8% of all verified intracranial tumors) seen in this Japanese series included 81 pinealomas (4.5%; about 10% of these were pineoblastomas) and 39 teratomas (2.1%) in the pineal region, and 16 ectopic pinealomas (many of them located around the third and lateral ventricles). At least 113/136 of these pts. were males and 67/136 were 1-15 yr. old, demonstrating the predilection of pinealomas for boys in the 1-15 yr. age group.

69-1947 SPINAL CORD DYSEMBRYOPLASTIC TUMOURS. (E.) Arseni, C. (State Hosp., Bucharest). Psychiat. Neurol. Neurochir. 71(6):509-519, 1968.

The 1935-1956 records of this hospital's neurosurgical clinic disclosed 56 pts. (25 males, 37 females, aged 5-68 yr.; 6/56 aged 0-10 yr., 11/56 aged 11-20 yr.) with dysembryoplastic tumors of the spinal cord (46 epidermoid, 9 dermoid, 1 teratoma), accounting for 6.7% of all spinal cord tumors. Clinical symptoms of spinal cord lesions began after spinal injuries in 20/56, but some of the tumors (number unspecified) were believed to be congenital. Congenital malformations of the spine were noted in 19/56; 1 pt. showed supernumerary toes, and 27/56 showed widening of the vertebral canal (as demonstrated by the Elsberg-Dyke sign). The differential diagnosis of these tumors is discussed.

69-1948 TRENDS IN THE DEVELOPMENT OF GLIAL TUMORS OVER A TWENTY-YEAR PERIOD (1946-1966). (Pol.) Szydłowska, H. (Lab. Path. Neurosurg., PAN, Cracow, Poland) and E. Szwagrzyk. Folia Med. Cracov. 10(3):505-514, 1968.

The records of the Neurosurgical Clinic of the Cracow Medical Academy for 1946-1966 (inclusive) were examined, to determine the incidence of gliomas (astrocytoma, glioblastoma multiforme, oligodendroglioma, mixed glioma) as a percentage of the brain tumors operated on each yr. The number of cases is not stated. Gliomas accounted for 45.49% of all brain tumors operated on in 1946 and 63.69% in 1966. Most of this increase was seen in 1946-1957 (when this clinic was established); the proportion of gliomas was thereafter stabilized at about 60% (30% glioblastoma multiforme, 20% astrocytoma, 10% oligodendroglioma). Further analysis of the data (the "glial tumor index" for each 3-yr. interval) suggested that the incidence of gliomas (as a percentage of operated brain tumors) was not increasing, but a tendency was seen towards an increase in the highly anaplastic tumors (glioblastoma multiforme), at the expense of the more differentiated brain tumors (astrocytoma, oligodendroglioma, mixed glioma) reported to this clinical center.

69-1949 "INTRACRANIAL TUMOURS IN CEYLON." (E.) Cabraal, S. A. (Gen. Hosp., Colombo). Ceylon Med. J. 13(2):57-67, 1968.

The 1957-1966 records for 2 units of this hospital showed benign and malignant tumors in 1.7% of 367,157 surgical admissions and 8.2% of 6758 neurosurgical admissions. Cancer of the breast was the most frequent tumor (2312/6940 tumors), followed by tumors of the stomach (930), skin (771), bone (596), rectum (586) and brain (559). The records of the Neurosurgical Unit of this hospital for June, 1956-December, 1967, showed intracranial lesions in 6382/9322 pts., including 739 histologically verified brain tumors (7.9% of all admissions, 11.5% of all intracranial lesions). When 234 pts. with suspected brain tumors were added to these 739 cases, the brain tumor incidence was about the same as that reported in 1 British series (9.1% of 30,103 admissions; National Hospital for Nervous Diseases, London). In the group of verified brain tumors, the most frequent tumor types were gliomas (27.1%), meningiomas (20.2%), acoustic neurinomas (12.7%), pituitary adenomas (5.9%), medulloblastomas (4.2%), and congenital tumors (about 4.3%); this group also included 61 tuberculomas (8.2%) and 1 hydatid cyst of the brain. Comparison of these frequencies with those reported in several series from other nations (U.S., Sweden, Japan and India) showed a comparatively low incidence of gliomas, congenital neoplasms and metastatic tumors (3.6% in this Ceylonese group), about the same proportions of acoustic neurinomas and pituitary adenomas, and relatively high proportions of meningiomas and tuberculomas, by comparison to the Western groups. As in other reports from Asian nations, the peak age at onset in this group was about 10 yr. below the peak ages seen in Western nations. In this group the male:female ratio was 3:2, compared to the worldwide av. of 2:1. No significant racial, ethnic or geographical variations in the brain tumor incidence were noted.

69-1950 EPIDEMIOLOGY OF LEUKEMIA. (Jap.) Murano, T. (Aichi Cancer Inst., Nagoya, Japan), H. Nishiyama and T. Inoue. Nippon Rinsho (Jap. J. Clin. Med.) 26(8):1863-1866, 1968.

Regional variations in leukemia mortality rates were studied in 3 prefectures of Tokai Province, on the basis of 915 pts. who died in 1962-1966. A tendency toward clustering (defined here as 2 or more cases over 1 yr.) was seen in some of the smallest communities, especially those with populations of 0-500 persons. This variation was shown in a Poisson curve of leukemia mortality rates. Other factors such as occupation, histories of drug treatment, family history and the keeping of domestic animals were apparently without significance. The over-all leukemia mortality rate in this region is not stated.

69-1951 GEOGRAPHICAL DISTRIBUTION OF CANCER OF THE UROTHELIUM IN YUGOSLAVIA. A SUSPICION OF A SPECIAL CARCINOGENIC AGENT. (E.) Petkovic, S. (Urol. Clin., Belgrade), M. Mutavdzic, V. Petronic and V. Markovic. Urologia (Treviso) 35(4):425-432, 1968.

From 1921-1943, 26 tumors of the renal parenchyma, 3 of the renal pelvis and 2 of the ureter were seen in Yugoslavia. From 1944-1966, the numbers of such tumors increased to 205, 152 and 71, resp. This marked increase in the number of urothelial tumors coincided with the postwar appearance of the "endemic nephritis" (EN) or "Balkan nephritis" syndrome, which is found only in certain inundation areas of the Balkans, particularly small communities where the water supplies come from low-level wells depending on the changing levels of the nearest rivers. A viral agent or chemical water pollution (heavy metals, industrial wastes or silicates) may be implicated. Analysis of data on 322 pts. with urothelial tumors (renal pelvis and ureter) showed a very close association with EN. In 4 large cities in EN-free regions (populations 60,000-1 million), the frequencies of urothelial tumors ranged from 0/60,000 population (Kragujevac) to 1/33,000 (Belgrade); in 6 cities in EN regions (populations 25,000-81,093), the frequencies ranged from 1/8109 population (Bijeljina) to 1/2980 (Lazarevac); in 9 villages where EN is localized (populations 734-2000), the frequencies ranged from 1/188 population (Cvetovac) to 1/1214 (Klenje). A map is included, showing several tumor clusters in the valleys of the Danube and 2 of its tributaries (Sava and Morava), always in EN areas. This group of Yugoslavian pts. with tumors of the renal pelvis or ureter differed from similar groups reported in other nations in several respects: a high incidence of renal insufficiency (very rare elsewhere), especially in pts. from EN areas; a male:female ratio of 1:1 (2:1 to 3:1 elsewhere); and a low relative proportion of squamous cell carcinomas (5%; about 20% elsewhere), although the relative proportions of papillary tumors were about the same in this group as in other nations. Urinary infections were very rare in this group. Analysis of data from 796 cases of bladder cancer, seen in the 11-yr. period 1956-1966, showed about the same high frequency of this tumor in EN areas as in Yugoslavia as a whole.

69-1952 THE RACIAL INCIDENCE OF TESTICULAR TUMOURS. (E.) Tiltman, A. J. (U. Cape Town Sch. Med., South Africa). S. Afr. Med. J. 43(5):97-98, 1969.

The 1940-1967 records of the Groote Schuur Hospital (Cape Town) disclosed 62 testicular tumors: 24 teratomas (39%), 19 seminomas (30%), 4 combined tumors (seminoma and teratoma), and 14 tumors of other types. Although Cape Colored (mixed European, Hottentot and Malay ancestry) and Bantu pts. accounted for 44% and 9%, resp., of the total hospital admissions during this 28-yr. period, only 15/47 (32%) testicular tumors of the seminoma-teratoma group were seen in these non-white pts. (14 Cape Colored, 1 Bantu). The other 32 tumors of this type (68%) were found in white pts., who accounted for 47% of the total hospital admissions. This pt. group included only 1 other Bantu pt. (with a Sertoli cell tumor); 2/2 with interstitial cell tumors, 2/2 with metastatic tumors (1/2 from the prostate, 1/2 from the large intestine) and 3/7 with testicular lymphomas were white, while the other 6 pts. (including 1 child with an orchioblastoma) were Cape Colored. No racial difference was seen with respect to age incidence. The incidence of testicular tumors of the seminoma-teratoma group was higher in Cape Colored pts. in this series (30% of the tumors of this type) than in other reported pt. groups of a similar type, but the incidence was still significantly higher in white pts. than in non-white pts.

69-1953 MORBIDITY AND MORTALITY AMONG OFFSPRING OF BREAST CANCER MOTHERS. (E.) Tokuhata, G. K. (Pennsylvania Dept. Health, Harrisburg). *Amer. J. Epidem.* 89(2):139-153, 1969.

Over-all mortality rates in 1232 offspring of 551 women who died of breast cancer (Group I; 612 males, 620 females) were significantly lower than the mortality rates in 1487 offspring of 551 age- and race-matched control women who died of all other causes (Group II; 729 sons, 758 daughters). This difference, resulting largely from a lower mortality rate in white males of Group I, became insignificant when children under 10 were excluded from consideration. Malignant tumors were noted in 3.2% of Group I and 2.8% of Group II (not a significant difference); benign tumors were noted in 10.7% and 7.3%, resp. (a highly significant difference). A female prevalence was noted in the groups with either benign or malignant tumors. The prevalences of malignant female breast tumors, benign female breast tumors, malignant lymphatic and hematopoietic tumors, and benign skin tumors were significantly higher in Group I than in Group II; observed/expected ratios in the numbers of such cases in Group I (based on morbidity and mortality data from Group II) were 10/2.16, 29/6.83, 5/2.25, and 27/9.42, resp. No significant differences between the groups were seen in the prevalences of malignant tumors of the skin or buccal cavity and pharynx, benign lipoma, or benign female genital tumors.

69-1954 INCIDENCE OF CANCER OF THE CERVIX IN ICELAND, 1955-1966. (Ic.) Jóhannesson, G. (State Hosp., Reykjavik, Iceland). *Laeknabladid* 54(5):189-208, 1968.

In the 10-yr. period 1955-1964, 142 women with cancer of the cervix (Stage I in 35%, Stage II in 36.5%, Stage III in 16.5%, Stage IV in 12%) were treated in Iceland. The av. annual incidence/100,000 women (all of Iceland) for this 10-yr. period was 16.5, compared to 12.2 for the previous 10-yr. period, 12 in 1965, and 31 in 1966. The relative frequencies of carcinoma *in situ* and invasive carcinoma are not stated. The possible etiologic influences of heredity, infections (particularly *Trichomonas* vaginitis), hormonal factors (particularly estrogens), age and marital status (combined), and circumcision are discussed, but no data on these factors for this Icelandic group are included.

69-1955 ULCER OF THE UTERINE CERVIX IN THE JAPANESE FEMALE WITH REFERENCE TO THE HIGH MORTALITY FROM CERVICAL CANCER. (E.) Imai, T. (Kyushu U., Fukuoka, Japan) and T. Wada. *Acta Path. Jap.* 18(2):161-170, 1968.

Cervical histology was examined in 129 uteri from Japanese women (63 specimens removed surgically for lesions other than uterine cancer; 66 random autopsy specimens from women dying of diseases other than uterine diseases). Fresh or chronic ulceration of the squamocolumnar junction of the cervix was noted in 57.1% of the surgical specimens and 65.2% of the autopsy specimens. These ulcers (shallow erosions and cervicitis were not counted as ulcers) showed the same topographical distribution as cancer of the cervix. Examination of 3 additional surgical specimens, from pts. with carcinoma *in situ* of the cervix, showed scar-like depressions at the bases of 2/3 tumors. The total incidence of ulceration of the cervix was about the same in each age group, but fresh ulcers (some with signs of epithelial regeneration) were more frequent in the younger women than in the older groups, and healed ulcers were more frequent in the older women than in the younger groups, suggesting the possibility of a cycle of ulceration and repair in the cervix. The possible relationship between this high frequency of cervical ulceration and the high mortality from cancer of the cervix in Japan is discussed.

69-1956 DYSPLASIA, CARCINOMA *IN SITU*, AND INVASIVE CARCINOMA OF THE CERVIX UTERI IN PREVIOUSLY SCREENED WOMEN. (E.) Høeg, K. (Norsk Hydro's Inst. Cancer Res., Oslo) and V. Roger. *Scand. J. Clin. Lab. Invest.* 22(Supp.106):173-180, 1968.

A mass screening study (1959) of 35,528 Norwegian women (age 25-59 yr.) showed dysplasia, carcinoma *in situ* and invasive carcinoma of the cervix in 1.4%, 4.3% and 1.2%, resp. (49,151 and 42 pts., resp.). A follow-up study of 27,252/35,528 women (each woman was examined 2 yr. after the first examination) showed dysplasia, carcinoma *in situ* and invasive carcinoma in 1.4%, 1.8% and 0.6%, resp. (37, 53 and 18 pts., resp.). The cervical smears of 43/108 of the women in the second group were revised into a higher cytological class (58 remained in the same class and 7 were not evaluable). Invasive or microinvasive carcinoma was seen in 11/81 with lesions initially described as Class I through Class II-III, and in 9/20 with lesions initially described as Class III through Class IV. It is concluded that neoplastic lesions of the cervix, detected by mass screening at 2-yr. intervals, apparently progress slowly and show limited extension and low-grade malignancy, whereas lesions detected between screenings are of high-grade malignancy and show a rapid growth rate.

69-1957 ETHNIC DISTRIBUTION OF CERVICAL CARCINOMA IN A CYTOLOGIC SCREENING PROGRAM. (E.) Schweid, A. I. (U. Washington, Seattle), J. L. Bennington and D. C. Figge. Acta Cytol. (Balt.) 13(3):139-141, 1969.

The ethnic distribution of 310 pts. with cervix cancer and 564 normal women seen from 1960-end of 1967 (Gynecologic Tumor Registry, University of Washington) was studied. The ratio of carcinoma *in situ* to invasive carcinoma (165 and 145 cases, resp.) remained about the same throughout this period. Indian women comprised 6.5% of the pt. group and only 2.7% of the control group; Negro women comprised 19.7% of the control group and only 13.9% of the pt. group (both differences were significant). Caucasians, Orientals, and women of other ethnic groups comprised about the same percentages of the pt. group (77.7%, 1.3% and 0.6%, resp.) and the control group (75.8%, 0.9% and 0.8%, resp.). Carcinoma *in situ* was seen in 70% of the Indian pts., 58% of the Negro pts., 51% of the Caucasian pts., and 50% of the Oriental pts. The ratio of carcinoma *in situ* to invasive carcinoma in the Indian pts. was not significantly different from the ratio seen in the other ethnic groups. Part of the difference in the ethnic compositions of the pt. and control groups was attributed to a difference in age distribution between the ethnic groups: 40% of the Indians were in the high-cervix cancer prevalence 30-44 yr. age group (compared to 20% of the Caucasians and 31% of the Negroes; totals, 34.2% of the pts. and 22.5% of the controls), whereas 39% of the Negroes were in the low-prevalence 15-29 yr. age group. Most of the Indians in the Seattle area (comprising 0.3% of the area's population in 1960) are transients, of low socioeconomic status. Other possible etiologic factors mentioned (but not discussed in relation to this group) include parity and early pregnancy.

69-1958 EPIDEMIOLOGY OF HUMAN AND BOVINE LEUKEMIA IN LATVIA. (Rus.) Khokhlova, M. P. (Cent. Inst. Hemat. Blood Trans., Moscow), L. I. Iavorkovskii, A. G. Pinus, L. D. Orlova, I. B. Sushchenko, M. V. Zaitseva, V. N. Malanina, E. Ia. Iaunsleinis and V. A. Dzenis. Probl. Gemat. 13(10):35-39, 1968.

The incidence of human leukemia and related diseases (including Hodgkin's disease, reticulum cell sarcoma and myeloma) in Latvia in 1963, 1964 and 1965 was 9.4, 11.8 and 10.7/100,000 population, resp. The leukemia incidence was about the same in urban and rural communities, and varied from 5.4-16.9/100,000 in different regions of Latvia (it was 13.9 in Riga). Acute and chronic leukemia and related diseases caused 35.1%, 33.0% and 31.9% of the leukemia deaths, resp. In 1963, 1964 and 1965, the incidence of bovine leukosis (leukemia) in Latvia was 98.7, 119.3 and 151.2/100,000, resp., varying from less than 20 to 419/100,000 in different regions of Latvia. No correlation was found between the leukemia incidence in man and in cattle.

69-1959 CLINICAL-STATISTICAL DATA ON A GROUP OF PATIENTS WITH LUNG CANCER STUDIED OVER A LONG TIME PERIOD. (It.) Mazzarella Farao (San Filippo Neri Hosp., Rome), O., A. Mosca and S. Benedetti Valentini. Osped. Ital. Chir. 19(2):97-117, 1968.

From 1955-1966, 290 pts. with lung cancer were seen at this hospital's Department of Thoracic Surgery (70/290 in 1955-1960, 220/290 in 1961-1966). This group included 264 men and 26 women (male:female ratio of 10:1), mostly in the 51-70 yr. age group. Histories of smoking were reported by 223/264 men (84.5%) and 8/26 women (30.8%); 40% of all pts. smoked 20-25 cigarettes/day. Histories of pulmonary diseases and injuries were reported by 126/264 men (47.7%) and 11/26 women (42.3%), but only 1 of these pts. had a history of pulmonary tuberculosis. A possible occupational etiology was considered for 28/290 (9.6%). Mortality rates from respiratory cancer (larynx, trachea, bronchus and lung) in all of Italy increased from 4.16/100,000 population in 1942 to 5.68 in 1962; this increase in the respiratory cancer mortality rate was not as large as the increases seen in other nations (such as the U.S., Great Britain, Germany and France).

69-1960 TUMOURS OF THE FEMALE GENITALIA IN CATTLE, SHEEP AND PIGS FOUND IN A BRITISH ABATTOIR SURVEY. (E.) Anderson, L. J. (U. Glasgow, Scotland) and A. T. Sandison. J. Comp. Path. 79(1):53-63, 1969.

Histological examination of specimens obtained from cattle, sheep and swine slaughtered at 100 abattoirs in Great Britain from October, 1965-September, 1966, showed true neoplasms in 302/1.3 million cattle, 107/4.5 million sheep and 139/3.7 million swine. Female genital tumors were seen in 20/302 cattle (7%; 11 ovarian, 5 uterine, 3 cervical, 1 vaginal), 2/107 sheep (2%; both uterine), and 6/139 swine (4%; 4 ovarian, 2 uterine). The 15 ovarian tumors were usually carcinomas of various types, and included the first reported cases of malignant granulosa cell tumor in a teratoma in a cow (1 case) and papillary serous cystadenocarcinoma in swine (2 animals). The 9 tumors of the corpus uteri all involved the smooth muscle or fibrous tissue; no epithelial tumors of the corpus uteri or endometrium were seen, but 4 cows showed ectocervical tumors (3 squamous cell carcinomas of the cervix, 1 vaginal fibroma). Secondary tumors of the female genital organs were noted in 4 cows (ovarian metastases from cholangiocarcinoma, kidney carcinoma or lung cancer in 1/4 each; uterine metastases from pelvic osteosarcoma in 1/4), and 2/57 swine with multicentric lymphosarcoma showed ovarian involvement.

No cases of squamous cell carcinoma of the vulva or "polypoidal fibroma" of the external genitalia were noted. No tumors of the male genital organs were found in this series, possibly because most males had been castrated and slaughtered before reaching maturity.

69-1961 SPONTANEOUS TUMORS IN HOLTZMAN-SOURCE RATS OF VARIOUS AGES. (E.) Schardein, J. L. (Parke, Davis & Co., Ann Arbor, Mich.), J. E. Fitzgerald and D. H. Kaump. Path. Vet. (Basel) 5(3):238-252, 1968.

In Holtzman-source, random-bred albino rats (Sprague-Dawley-derived), about 75% of which were used for drug toxicity studies (no other details), the total incidence of tumors at age 1-18 mo. was 4.3% (218/5086): 8.2% in females and 2.3% in males (139/1699 and 79/3387, resp.). As expected, the tumor incidence increased with age (83% of the tumors developed in rats at least 9 mo. old, and the incidence was 25.3% in males and 42.2% in females at age 15-18 mo.), but 6 rats developed tumors before age 3 mo. The most frequently observed tumors involved the adrenals (39% of the total; 43/79 in males, 56/139 in females), pituitary gland (13% of the total; 9/79 and 23/56, resp.) and mammary glands (about 21% of the total; 1/79 and 51/139, resp.). In females, the over-all mammary tumor incidence was 2.7%; when corrected for the minimal age of mammary tumor development (138 days), the incidence was about 6%. Adrenal, pituitary and mammary tumors were frequently associated with other tumors of the endocrine and/or genital organs. Life-table corrections of the data showed a potential for tumor development of 49% in males and 70% in females. The tumors observed included a variety of neoplasms infrequently reported in other studies of this type, which are described in detail.

69-1962 THE GENETICAL STRUCTURE OF POPULATIONS AND DEVELOPMENTAL TIME. (E.) Constantino, R. F. (Purdue U., Lafayette, Ind.). Genetics 60(2):409-418, 1968.

The basic equations of quantitative genetic theory (using single-locus and 2-locus models) were modified by introduction of the concept of developmental time, which proved to be of importance in evaluating the dynamics of population structure.

69-1963 KARYOMETRY OF CERVICAL CARCINOMA AND THE PRECEDING STAGES USING THE PARTICLE SIZE ANALYZER (TGZ-ZEISS). (Ger.) Hillemanns, H. G. (U. Women's Clin., Freiburg i. Brg., Germany) and E. Prestel. Z. Krebsforsch. 71(4):316-319, 1968.

The nuclear vol. of cells from pts. with carcinoma in situ or invasive carcinoma of the cervix, and with premalignant lesions of the cervix (dysplasia), was measured by the usual planimetric method, and the results were compared to those obtained with the Zeiss particle size analyzer. Both methods demonstrated an increase in nuclear vol. in the dysplasia stage, a reduction just before the invasive stage (carcinoma in situ), and an increase in the invasive carcinomas.

69-1964 CYTOMETRIC STUDIES IN MEDULLOBLASTOMA AND GLIOBLASTOMA. (Ger.) Sehrbundt, H.-J. (U. Clin., Cologne, Germany) and S. L. Gentile. Exp. Path. 2(6):381-386, 1968.

Planimetric cell surface determinations, interference microscopic studies and cytophotometric RNA determinations of cells from 2 medulloblastomas and 2 glioblastomas revealed higher mean values for cell surface, dry wt., nuclear and cytoplasmic protein conc. and cytoplasmic RNA content in glioblastomas than in the medulloblastomas. The possibility that the proteins of these 2 tumor types were of different structure is discussed. The RNA content was apparently proportional to the dry cell mass per unit surface area.

69-1965 CRITERIA OF MALIGNANCY AND THEIR ADAPTABILITY, SHOWN IN A MODEL OF A CHEMICALLY INDUCED EAR DUCT TUMOR IN RATS. (Ger.) Nitze, H. R. (U. ENT Clin., Frankfurt/Main, Germany), G. Rosemann and J.T.-Y. Chou. Arch. Klin. Exp. Ohr. Nas. Kehlkopfheilk. 192(2):214-228, 1968.

The malignancy of ear duct carcinomas (well-differentiated, partly keratinized squamous cell carcinomas), induced in albino rats by feeding of 4-dimethylaminostilbene (doses not stated), was studied by histological, cytogenetic, cytophotometric, and micro-respiratory methods. Cytogenetic studies suggested that these tumors developed from the ceruminous glands of the skin of the auditory meatus. The low oxygen consumption of these tumor cells suggested anaerobic metabolism. The mean doubling time of the tumor cells was 34.0 days, and the DNA content (measured by ^{3}H-thymidine autoradiography) suggested the presence of a hypooctoploid stemline. In 5 tumors treated with a single dose of X-rays (1000 rads), the cell cycle time was nearly doubled (mean, 52 days) and the hypooctoploid stemline was absent. Since DNA synthesis continued without interruption in the irradiated tumors, it is suggested that the tumors continued to develop endomitotically until the establishment of a new stemline.

69-1966 RELATIONSHIP BETWEEN PROLIFERATION, VOLUME, PROTEIN AND DNA CONTENT OF EHRLICH ASCITES TUMOR CELLS IN SUSPENSION CULTURES. (Ger.) Karzel, K. (U. Bonn, Germany) and W. Breull. Arzneimittelforschung 18(12): 1504-1506, 1968.

Ehrlich carcinoma cells in vitro showed a 2.15-fold increase in number in 24 hr. and a 3.20-fold increase from 24-48 hr. The protein content increased at the same rate as the cell number in the first 24 hr., but at a lower rate in the next 24 hr. Cell vol. remained almost stationary for 24 hr., then decreased. The DNA content was about the same after 24 and 48 hr. (0.84 and 0.81 $\mu g/10^5$ cells, resp.). The specific wt. of the cells was 1.0156-1.0234.

69-1967 A MATHEMATICAL ANALYSIS OF THE GROWTH AND SPREAD OF BREAST CANCER. (E.) Blumenson, L. E. (Roswell Park Mem. Inst., Buffalo, N. Y.) and I. D. J. Bross. Biometrics 25(1):95-109, 1969.

Equations were derived to express the growth rate of a breast cancer, the delay between the time the tumor reaches detectable size (1 cm in diameter) and mastectomy, the probability of involvement of 0, 2 or 4 lymph nodes at the time of mastectomy, and the probability of the subsequent development of distant metastases (by 18 mo. after mastectomy). The results of the mathematical analysis did not provide conclusive proof of the "2-disease" hypothesis of breast cancer.

69-1968 THE INFLUENCE OF THE RELATIONSHIP "LOCAL TUMOR EXTENT-TIME" UPON THE EVOLUTION OF TUMORS OF THE NASOPHARYNX. (E.) Bohorquez, J. F. (Michael Reese Hosp. Med. Ctr., Chicago, Ill.). Amer. J. Roentgen. 105(3): 536-549, 1969.

The relationships between crude 5-yr. survival rates and several parameters of tumor growth were studied in 152 pts. with carcinoma of the nasopharynx (male:female ratio 2.1:1), treated with orthovoltage radiotherapy. Highest survival rates were seen in pts. in the 31-40 yr. age group, especially in women (the peak incidence was in the 41-60 yr. age group), pts. with undifferentiated carcinomas (crude survival rates in these pts. were almost 3 times as high as in pts. with squamous cell carcinomas), pts. with Stage T_1 and N_0 tumors, and pts. with symptoms of 6-9 mo. duration at diagnosis. The lowest survival rates were seen in the youngest pts. (0/15 in the first 2 decades survived 5 yr.), pts. with tumors arising in the posterosuperior wall of the nasopharynx (the most frequent initial site), and pts. with tumors spreading to the base of the skull.

69-1969 CANCER OF THE ORAL CAVITY, PHARYNX, ESOPHAGUS, AND INTESTINE IN CHILE. (E.) Zaldívar, R. (Fairleigh Dickinson U., Madison, N. J.) and M. Mella. Proc. Amer. Ass. Cancer Res. 10:102, 1969.

69-1970 CLINICAL STUDY AND PROGNOSIS IN THE ASSOCIATION BETWEEN PULMONARY TUBERCULOSIS AND LARYNGEAL CARCINOMA. (It.) Greco, S. (U. Modena, Italy), G. Lovino, R. Balli and G. Benatti. Boll. Mal. Orecch. 86(2):154-164, 1968.

See also abstract nos.: 1660,1661,1697,1698,1699,1979,1980

9-1971 EPIDEMIOLOGY OF BREAST CANCER. (Jap.) Watanabe, H. (Natl. Cancer Inst. Japan, okyo) and T. Hirayama. Nippon Rinsho (Jap. J. lin. Med.) 26(8):1843-1849, 1968.

elationships between breast and uterine cancer nd hormonal metabolism were studied in 264 omen seen from 1965-1967. When the relative isk of cancer in married women was set at 1.0, he relative risks of breast and uterine cancer n unmarried women were 3.77 and 0.91, resp. hen the relative risk of cancer in women who ad been married before age 19 yr. was set at .0, the relative risks of breast and uterine ancer in women marrying after age 30 yr. were .86 and 0.25, resp. The relative risk of breast ancer decreased with the number of births. It s concluded that early stimulation of the ormones of pregnancy and lactation, as well as bnormalities of their metabolic status (as in nmarried or nulliparous women, or women with istories of abortion), increase the relative isk of breast cancer.

9-1972 CLINICAL AND MORPHOLOGICAL CHARACTERISTICS OF CANCER OF THE LARYNX, FROM HE DATA OBTAINED AT THE KIEV OTOLARYNGOLOGY ESEARCH INSTITUTE OVER SIX YEARS (1962-1967). Rus.) Brovko, T. E. (Otolaryng. Res. Inst., iev, USSR) and S. G. Voitsekhovskaia. Zh. shn. Nos. Gorl. Bolez. 28(4):39-44, 1968.

n 1962-1967 (inclusive), 941 pts. with tumors f the larynx were seen at this institute. Most umors were keratinized or non-keratinized quamous cell carcinomas, but 6 sarcomas were lso noted; 1.6% of the tumors were metastatic nd 98.4% were primary. Predisposing causes ncluded papilloma or pachydermia in 6%, chronic aryngitis in about 20%, pulmonary tuberculosis n 6%, and injuries of the larynx in 3 pts. ransitional stages between papilloma or pachy- ermia and cancer were identified in 4.4% of the ts.

9-1973 NEOPLASIA AND THE COELIAC SYNDROME IN ADULTS. (E.) Brunt, P. W. (Western Gen. Hosp., Edinburgh, Scotland), W. Sircus and N. MacLean. Lancet 1(7587):180-184, 1969.

The records of this hospital from 1958-1967 disclosed 35 primary malignant tumors of the small intestine or mesenteric lymph nodes. No signs of malabsorption were seen in 20 pts. with carcinomas (12), leiomyosarcomas (2) or malignant carcinoid tumors (6) of the small intestine, but unequivocal symptoms of malabsorption were noted in 13/15 with malignant lymphomas of the small intestine and/or mesenteric lymph nodes. In the 2 exceptional cases, the total duration of symptomatic disease was brief. In the 13 pts. with malabsorption, the architecture of the villi was not correlated with the severity or duration (before the diagnosis of lymphoma) of malabsorption symptoms, or with the tumor histology. Malabsorption symptoms had lasted less than 7 yr. (before the diagnosis of lymphoma) in 11/13; the other 2/13 apparently had primary celiac disease (over 10 yr. in duration), and had responded well to gluten-free diets until the onset of symptoms that were later attributed to the lymphomas. It is suggested that atrophy of the villi may be a fundamental disturbance of mucosal stability, associated with or predisposing to the development of a tumor, as in ulcerative colitis (1 case possibly resulting from such a process is described), or that the tumor may induce malabsorption. A careful search for an abdominal lymphoma is recommended for middle-aged pts. with malabsorption symptoms of recent onset.

69-1974 FAMILIAL VON HIPPEL-LINDAU'S DISEASE. CASE REPORT. (E.) Wright, R. L. (Harvard Sch. Med., Boston, Mass.). J. Neurosurg. 30(3,Pt.1):281-285, 1969.

A family with von Hippel-Lindau's disease (familial hemangioblastoma) affecting 4 males and 6 females in 4 generations is described. The diagnosis was confirmed pathologically in 6/10. One of the female pts. (fourth generation) showed hemangioblastomas of both retinas, the medulla and 1 lumbar nerve root (an unusual tumor site in this syndrome) as well as the cerebellum.

69-1975 FAMILIAL PREDISPOSITION TO CANCER OF THE LARYNX. (It.) Fini-Storchi, O. (U. Florence, Italy) and L. Lippi. Boll. Mal. Orecch. 86(3):319-336, 1968.

A 10-yr. survey of the authors' pts. disclosed 5 families in which 2 or more relatives had cancer of the larynx (LC; spinocellular carcinoma in all cases). In 1 family, 3 cases of LC were diagnosed over a single 10-mo. period, in 2/5 brothers (whose oldest brother and mother had died of stomach and breast cancer, resp.) and 1/2 of their male first cousins on the father's side (whose brother, mother and maternal aunt had died of cancer of the liver, rectum and breast, resp.). The fathers, paternal grandparents and sisters of these 3 LC pts. were without cancer. In another family, LC was found in 2/5 sisters and 1/4 brothers, and lung cancer in another brother (the family history was otherwise negative). In the other 3 families, with otherwise negative histories, the relatives with LC were a father and son and 2 pairs of brothers. In 1 pair of brothers, LC was diagnosed over a single 9-mo. period (1 brother died of stomach cancer after successful treatment of LC). In the 2 sisters, the 2 pairs of brothers and the 3 cousins with LC, the ages at diagnosis were similar within each family group (the differences in age were 2-5 yr.). All of these LC pts. had smoked 15-20 cigarettes/day for unspecified periods of time. A literature review (83 references) and discussion of familial cancer are also included.

69-1976 HEREDITY AND CARCINOMA. (E.) Lynch, H. T. (Creighton U. Sch. Med., Omaha, Neb.), D. E. Anderson, A. J. Krush and A. L. Larsen. Ann. N.Y. Acad. Sci. 155(3):793-800, 1968.

The authors' experiences with 6 "cancer families," comprising 910 persons (447 males, 463 females; 684/910 were over 20 yr. old), are discussed. Malignant tumors were noted in 165/910: cancer of the colon in 75/165, cancer of the endometrium in 45/165, multiple primary tumors in 31/165 (18.1%, including 13/31 with colon and endometrial cancer), and tumors of other primary sites in 68/165. In these families, the av. ages of onset of cancer of the endometrium and colon were 45 and 43 yr., resp., compared to approx. 62 and 55 yr., resp., in the general population. It is suggested that these families have an inherited predisposition to multiple primary tumors, particularly cancer of the endometrium and colon in women, and cancer of the colon and other sites in men. In such families, cancer of the colon and endometrium may be etiologically related. Another study of 154 women with cancer of the endometrium showed multiple primary tumors in 11%, and histories of cancer of the endometrium in first-degree relatives in 16% of the pts., but none of the pts. had both cancer of the colon and cancer of the endometrium. This study suggested a second, site-specific genotype for cancer of the endometrium. (See also CRA 7(6):#1323, June, 1969.)

69-1977 ANIRIDIA AND WILMS'S TUMOUR (NEPHROBLASTOMA). (E.) MacKintosh, T. F. (U. Dundee, Scotland), T. G. Girdwood, D. J. Parker and I. M. Strachan. Brit. J. Ophthal. 52(11):846-848. 1968.

A 3-yr.-old girl with non-familial, bilateral aniridia and Wilms' tumor is described, bringing the total number of such reported cases to 12. None of these pts. had familial aniridia. Although no evidence was found of any factor(s) acting in early pregnancy in this case, it is suggested that some such factor(s) may act on the mesoderm of both the eye and the kidney. Careful examination to detect Wilms' tumor is recommended for all infants with non-familial aniridia.

69-1978 DOWN'S SYNDROME AND LEUKEMIA IN A FAMILY. (E.) Ebbin, A. J., C. W. Heath, Jr., R. E. Moldow and J. Lee. J. Pediat. 73(6):917-920, 1968.

A 4-yr.-old girl with acute lymphocytic leukemia and a family history of Down's syndrome is described; 1 brother, 1 maternal aunt and 1 maternal second cousin (male) had confirmed trisomy G, while a maternal first cousin once removed (male) had the clinical signs of Down's syndrome. Cytogenetic findings in the pt., her parents and 8/9 siblings were normal. It is suggested that in those occasional families which have multiple members with leukemia, Down's syndrome or other chromosomal aberrations, some etiologic relationship may exist between such disorders.

69-1979 PATHOGENESIS OF LEUKEMIA. (Rus.) Vorob'ev, A. I. (Cent. Inst. Postgrad. Med., Moscow), A. E. Baranov, M. D. Brilliant, M. A. Volkova, E. K. Piatkin and R. P. Iurgutis. Probl. Gemat. 13(3):3-10, 1968.

Hyperdiploid stem cells were noted in bone marrow specimens from 11/14 pts. with chronic myeloid leukemia (CML) in acute transformation; aneuploid cells from 4 pts. contained 2 Philadelphia (Ph^1) chromosomes. The number of aneuploid cells decreased during remission in these pts. It is suggested that the acute transformation of CML results from mutation, not dedifferentiation, of the myeloid cells. In bone marrow specimens from 16 pts. with acute leukemia, the number of aneuploid cells present corresponded to the proportion of leukemic cells in the myelogram. It is suggested that the cells had become leukemic as a result of mutation. Sera from pts. with acute leukemia or CML suppressed thrombocytopoietin formation in mice. A genetic factor in the pathogenesis of leukemia was suggested by a study of 194 Russian and Jewish pts. with CML (67 Russians, 19 Jews) or chronic lymphatic leukemia (CLL; 61 Russians, 47 Jews). The more "benign" form of CLL (as defined by the clinical course and the degree of cellular atypia) seemed to be more frequent in the Jewish pts. than in the Russians (no other details).

69-1980 GENETICS IN ACUTE LYMPHATIC LEUKEMIA IN CHILDHOOD. (E.) McCullough, J. J. (U. Minnesota Hosp., Minneapolis), M. T. Korobkin and W. Krivit. Ann. N.Y. Acad. Sci. 155(3): 777-783, 1968.

Family cancer histories were obtained (by questionnaires and interviews) from the relatives of 24/36 children (under 15) with acute lymphatic leukemia admitted to this hospital from July, 1963-July, 1965 (LR group), and from the relatives of 25 children without malignant diseases (CR group). In these groups, 217/1274 (17%) and 204/1340 (15.2%), resp., had died. Cancer deaths were reported in 29/1274 (13.4%)

of the LR group and 23/1340 (11.3%) of the CR group (the expected numbers of deaths over a 5-yr. interval, based on cancer mortality data for Minnesota, were 37.3 and 35.7, resp.). Adding the persons alive with cancer, the total number of reported cancer cases was 37/1274 in the LR group and 32/1340 in the CR group, including 2/37 and 1/32, resp., with leukemia (3/3 were grandparents or grandparents' siblings). Only 1 cancer death in a parent was reported (a parent of the CR group); no cases of cancer were reported in siblings of either group. The distributions of tumor types were somewhat different in the 2 groups, but the number of cases was too small for evaluation. It is concluded that the incidence of malignant diseases in relatives of leukemic children is increased only slightly if at all, and that the genetic influence in the great majority of such families is very weak.

69-1981 GENETIC STUDIES OF DISEASES ASSOCIATED WITH CHROMOSOMAL ABERRATIONS. (E.) Osborne, R. H. (U. Wisconsin, Madison). Ann. N.Y. Acad. Sci. 155(3):801-803, 1968.

In a brief discussion (14 references) of genetic factors associated with an increased susceptibility to malignant tumors, it is suggested that an interaction of 2 or more environmental factors (such as a physiological event that could enhance the virulence of an oncogenic agent or depress the defense mechanism) with such genetic factors should also be considered. One example is given, of 5-yr.-old monozygotic male twins of markedly different height and body wt. Following tonsillectomy, the smaller twin showed a marked growth spurt (abnormal at age 4-6 yr., at which age the lymphoid tissue also increases very little under normal conditions), and later developed acute leukemia. The other twin (who did not undergo tonsillectomy at that time) was alive without signs of leukemia several yr. later. It is suggested that tonsillectomy altered or disrupted physiological homeostasis in the twin who later developed leukemia.

69-1982 LEUKOCYTIC ALKALINE PHOSPHATASE IN MYELOPROLIFERATIVE SYNDROME. (E.) Mitus, W. J. (Tufts U. Sch. Med., Boston, Mass.) and K. A. Kiossoglou. Ann. N.Y. Acad. Sci. 155(3):976-979, 1968.

Leukocyte alkaline phosphatase (LAP) values, studied in cells from 158 pts., tended to be elevated in polycythemia vera (PV) and myelofibrosis, and low in acute or chronic granulocytic leukemia (CGL) and atypical myeloproliferative disorders. Elevated and low LAP values were noted in 8/18 and 7/18, resp., with the Di Guglielmo syndrome (erythremic myelosis, erythro-leukemia). In the differential diagnosis of polycythemias, high LAP values favored the diagnosis of PV. In the differential diagnosis of CGL and leukemoid reactions, low LAP values favored the diagnosis of CGL (although normal or high LAP values did not exclude the possibility of CGL). No good correlation was noted between LAP values and the presence or absence of the Philadelphia (Ph^1) chromosome (present in cells from 31/62 pts. examined), and no correlation at all between LAP values and other chromosomal abnormalities; however, since chromosomes are counted in immature cells and LAP values are measured in mature neutrophils, these 2 populations may not be comparable. It is suggested that the discrepant LAP values noted in different pts. with the same disease might result from the coexistence of 2 cell populations (1 normal, 1 leukemic) in different proportions in different pts.

69-1983 THE PHILADELPHIA CHROMOSOME AND LEUKOCYTE ALKALINE PHOSPHATASE IN CHRONIC MYELOCYTIC LEUKEMIA AND RELATED DISORDERS. (E.) Krauss, S. (Mt. Sinai Hosp., New York, N. Y.). Ann. N.Y. Acad. Sci. 155(3): 983-991, 1968.

The absence of the Philadelphia (Ph^1) chromosome in 13/33 pts. (38%) with chronic granulocytic (myeloid) leukemia (including 1 pt. with radiation-induced leukemia and 2 with eosinophilic leukemia) correlated with a poorer prognosis and a greater likelihood of an atypical clinical and histological picture than in Ph^1-positive pts., although only 1/7 leukemic pts. showing myelofibrosis with myeloid metaplasia was Ph^1-negative. No correlation between the karyotype and the levels of leukocyte alkaline phosphatase activity was apparent. The presence of the Ph^1 chromosome in pts. with atypical forms of this leukemia and other myeloproliferative disorders suggested that the Ph^1 chromosome is only 1 among several markers of the myeloproliferative syndrome.

69-1984 LEUKOCYTE ALKALINE PHOSPHATASE IN CHRONIC GRANULOCYTIC LEUKEMIA OF CHILDHOOD. (E.) Rosen, R. B. (City Hope Med. Ctr., Duarte, Calif.) and H. Nishiyama. Ann. N.Y. Acad. Sci. 155(3):992-1002, 1968.

A group of 19 children with Philadelphia (Ph^1) chromosome-positive (13/19) or Ph^1-negative (6/19) chronic granulocytic leukemia (CGL) showed 2 differences from adults with CGL with respect to leukocyte alkaline phosphatase (LAP) activity: LAP did not increase significantly during remission (this might reflect a difference in the degree of response to therapy), and LAP values were consistently higher in the Ph^1-negative children than in the Ph^1-positive children. This latter difference was not just a function of age, although the Ph^1-positive children were older than the Ph^1-negative children (ranges, 18 mo.-16 yr. and 5-16 mo., resp.). Changes in LAP activity during the course of the disease led to the suggestion that

Ph^1-negative ("atypical") CGL in childhood is a distinctive entity. A direct relationship between the Ph^1 chromosome and LAP was not established, but it is suggested that LAP synthesis is controlled by multiple factors, 1 of which is the genes on chromosome #21.

69-1985 CHROMOSOME STUDIES ON BLOOD DISEASES. I. CHROMOSOME STUDIES ON LEUKEMIA AND PRELEUKEMIA. (Jap.) Motomura, S. (Kyushu U., Fukuoka, Japan). Nippon Naika Gakkai Zasshi (J. Jap. Soc. Intern. Med.) 56(12):1457-1480, 1968.

Chromosome morphology was studied in cells from 56 pts. with leukemia and preleukemic diseases. All pts. with chronic myeloid leukemia (CML) showed the Philadelphia (Ph^1) chromosome, irrespective of the stage of the disease or the response to therapy. Since Ph^1 disomy persisted after CML was transformed into acute myeloid leukemia (AML), Ph^1 disomy was not responsible for this acute transformation. The Ph^1-negative cases seemed to have diseases other than CML. Many pts. with AML showed abnormalities of chromosome groups C and G; such abnormalities (C-9 trisomy, Ph^1 disomy) were also observed in pts. with CML in transformation to AML. It is suggested that the development of AML in pts. with CML occurs by new formation of AML, not by the transformation of CML to AML.

69-1986 CHROMOSOME STUDIES ON BLOOD DISEASES. II. ^{3}H-THYMIDINE AUTORADIOGRAPHIC STUDIES ON CHROMOSOME REPLICATION. PORPHYRIAS AND CHRONIC MYELOCYTIC LEUKEMIA. (Jap.) Motomura, S. (Kyushu U., Fukuoka, Japan). Nippon Naika Gakkai Zasshi (J. Jap. Soc. Intern. Med.) 56(12):1481-1487, 1968.

In normal human peripheral lymphocytes, DNA replication in vitro (studied by ^{3}H-thymidine autoradiography) lasted 11 hr., including 1-2 hr. for the G-2 phase and 2-3 hr. for the M phase. The replication patterns of chromosomes of normal lymphocytes and lymphocytes from pts. with porphyria were about the same. In lymphocytes from pts. with chronic myeloid leukemia, the Philadelphia (Ph^1) chromosomes belonged to the late-replicating G group, and chromosome A-2 completed its replication before chromosomes A-1 and A-3 (in contrast to the replication patterns seen in normal lymphocytes).

69-1987 ABNORMAL (MARKER) CHROMOSOMES IN TWO PATIENTS WITH ACUTE MYELOFIBROSIS. (E.) Mitus, W. J. (171 Harrison Ave., Boston, Mass.), N. Coleman and K. A. Kiossoglou. Arch. Intern. Med. (Chicago) 123(2):192-197, 1969.

Blood or bone marrow cells were examined for chromosomal abnormalities in 2 women with acute myelofibrosis (receiving no antileukemic agents or radiotherapy). A marker chromosome was found in 2/21 karyotyped metaphases from the peripheral blood cells of 1 pt. (bone marrow cells were unobtainable); 1 cell showed C and D monosomy (suggesting C/D translocation) and the other showed 2 C monosomies (suggesting C/C translocation). Bone marrow cells from the other pt. showed 2 types of marker chromosome. Type 1 markers (present in 14/16 karyotyped metaphases) resembled those seen in the blood cells of the first pt., and involved either D/E or D/F translocation. The Type 2 marker (involving A/B translocation) was present in 9/16 metaphases; both markers were noted in 8/16 metaphases (suggesting the sequential development of abnormal clones, by superimposition of additional changes on existing abnormalities). All cells with markers showed apparent D monosomy, together with either E or F monosomy. Other changes present (breaks, gaps, acentric fragments and deletions) suggested chromosomal damage.

69-1988 CHROMOSOMAL STUDIES IN TUMORS OF EMBRYONIC ORIGIN. (E.) Serr, D. M. (Tel-Aviv U. Sch. Med., Israel), B. Padeh, S. Mashiach and R. Shaki. Obstet. Gynec. 33(3): 324-332, 1969.

The karyotype of an ovarian teratoma (dermoid cyst) was female, with some mosaicism (46 XX/47 XX, C+), suggesting that it developed from the host's own cells. One hydatidiform mole (possibly a low-grade choriocarcinoma) showed a normal female karyotype (46 XX). Another hydatidiform mole, from a woman of normal female karyotype, was a male:female mosaic, with deletions and translocations in the female cells (46 XY/45 XX, D-, G-, t(GqDq)+), suggesting that the 2 clones were of fetal and trophoblastic origin.

AUTHOR INDEX

Aaronson, S. A. 1840
Adams, L. R. 1707
Aderca, I. 1859
Ahmed, M. 1913
Akamatsu, Y. 1837
Akinosi, J. O. 1942
Aldenderfer, P. H. 1875
Aldrich, C. 1839
Altstein, A. D. 1845
Altucci, P. 1804
Ambrosino, C. 1803
Ambrus, J. 1877
Ames, R. P. 1872
Anderson, D. E. 1976
Anderson, L. J. 1960
Anderson, N. G. 1919
Andrianjatovo, J. 1943
Angervall, L. 1751
Araki, C. 1946
Arima, M. 1935
Arkhipov, G. N. 1750
Arseni, C. 1947
Atanasiu, P. 1854
Atlee J. L., III. 1667
Aula, P. 1841

Bader, J. P. 1832
Balli, R. 1970
Bang, F. B. 1842
Bannasch, P. 1743
Baranov, A. E. 1979
Barbanti-Brodano, G. 1865
Barber, R. S. 1795
Barbieri, D. 1817
Bardos, T. 1877
Barski, G. 1684, 1817, 1818
Beard, D. 1819
Beard, J. W. 1819
Bell, T. M. 1809
Benatti, G. 1970
Benedetti Valentini, S. 1959
Benedetto, A. 1816
Bengtsson, U. 1751
Benjamin, T. L. 1848
Bennington, J. L. 1957
Benso, L. 1803, 1857
Bernardini, A. 1865
Bingas, B. 1701
Black, W. P. 1754
Blenkinsopp, W. K. 1721
Blumberg, B. S. 1671
Blumenson, L. E. 1967
Bodin, G. 1799
Bohorquez, J. F. 1968
Boiron, M. 1825
Bond, B. 1780
Bond, H. E. 1899
Botham, S. K. 1723
Bourgaux, P. 1849
Bourguignon, M.-F. 1849
Brande, R. 1795
Branton, P. E. 1850
Braun, D. D. 1733
Breull, W. 1966
Brill, E. 1774
Brilliant, M. D. 1979
Brodey, R. S. 1815
Bross, I. D. J. 1967
Brovko, T. E. 1712, 1972
Brown, E. R. 1808
Brunt, P. W. 1973
Bryan, G. T. 1766
Bulfone, L. 1875
Burkitt, D. P. 1661
Butler, W. H. 1746

Cabraal, S. A. 1949
Canivet, M. 1825
Cardiff, R. D. 1836
Caroline, N. L. 1878
Cassingena, R. 1863
Chang-Mei Tung, 1796
Chigirinsky, A. E. 1845
Chou, J. T.-Y. 1965
Chouroulinkov, I. 1732
Chu, E. H. Y. 1797
Churchill, W. H., Jr. 1792
Clawson, C. C. 1801
Cohen, M. M. 1719
Cohn, D. 1758
Coleman, N. 1987
Collet, M. 1799
Cooray, G. H. 1945
Coraggio, F. 1804
Correa, P. 1933
Costantino, R. F. 1962
Coto, V. 1804
Coventry, M. B. 1944
Cox, B. 1761
Cronin, A. P. 1773
Cuello, C. 1933

Dabrowski, S. 1906
Dao, T. 1789
Davies, D. G. 1941
Dean, P. N. 1696
Decleve, A. 1889
Defendi, V. 1682, 1864, 1910
De Harven, E. 1815
Deichmann, W. B. 1774
Deinhardt, F. 1920
DeLeva, A. M. 1847
Dent, P. B. 1801
DeOme, K. B. 1768
De Sauvage Nolting, W. J. J. 1925
Deutschländer, N. 1867
De Vargas, F. 1804
Diamond, L. 1717
Dillingham, L. A. 1785
Djaczenko, W. 1816
Dmochowski, L. 1805, 1806, 1874
Doak, P. B. 1800
Dodanova, N. N. 1845
Dorsey, M., Jr. 1870
Dove, L. F. 1737
Drożdżewska, Z. 1924
Druckrey, H. 1727
Duesberg, P. H. 1831, 1836
Dugue, E. 1933
Dulbecco, R. 1860
Dungworth, D. L. 1740
Dzenis, V. A. 1958

Ebbesen, P. 1672
Ebbin, A. J. 1978
Efskind, J. 1738
Ehrhardt, J.-P. 1715
Eker, P. 1738
Ekman, H. 1751
Enomoto, H. 1699
Epstein, S. S. 1716
Erb, P. 1843
Espiner, H. J. 1926

Faragó, L. 1937
Federman, M. 1887
Fefer, A. 1885
Feichtner, A. 1739
Feller, W. F. 1899
Ferguson, D. B. 1710
Figge, D. C. 1957
Filadoro, F. 1816
Finch, S. C. 1698
Fini-Storchi, O. 1975
Fink, M. A. 1810
Fiske, S. 1830
Fitzgerald, J. E. 1961
Flaks, A. 1725
Fogh, J. 1911
Forbes, P. D. 1711
Foster, H. 1875
Frankel, H. H. 1744
Frayssinet, C. 1741
Frickanisce, M. 1892
Fried, M. 1916
Fritz, R. B. 1819
Fritzson, P. 1738
Frosch, W. A. 1719
Fugmann, R. A. 1870
Fujimura, S. 1714
Fumarola, D. 1760

Gadomska, H. 1924
Gaffney, E. V. 1911
Gagné, W. E. 1740
Gallager, H. S. 1805
Gallagher, C. H. 1747
Gallagher, J. C. 1940
Gasser, M. 1843
Geary, N. 1885
Geering, G. 1815
Gelboin, H. V. 1666
Gentile, S. L. 1964
Gibson, W. 1884
Gillespie, A. V. 1813
Gillespie, J. H. 1679

Gillies, M. 1934
Gillot, F. 1799
Girdwood, T. G. 1977
Glass, R. M. 1744
Glover, E. L. 1737
Good, R. A. 1801
Goodall, C. M. 1665,1749
Govan, A. D. T. 1754
Grabska, J. 1816
Granados, R. R. 1923
Greco, S. 1970
Green, H. 1818
Green, M. 1838
Griffin, E. R. 1809
Grimaud, R. 1729
Groeschel, M. M. 1719
Grundmann, E. 1918
Guerin, M. 1732
Guillemain, B. 1825
Güthert, H. 1728

Haguenau, F. 1830
Hall, W. T. 1899
Hamerman, D. 1818
Hara, K. 1828
Harada T. 1927
Harding, J. D. J. 1795
Hardy, W. D., Jr. 1815
Harris, M. 1675
Harris, R. J. C. 1670
Hartley, J. W. 1886
Harvey, J. J. 1826
Hasegawa, K. 1851
Hasegawa, M. 1714
Haslam, S. 1900
Haupt, R. 1702
Hayford, A. H. 1844
Häyry, P. 1864
Heath, C. W., Jr. 1978
Heberling, R. L. 1681
Heidelberger, C. 1771
Hertz, R. 1662
Hierowski, M. 1752
Hillemanns, H. G. 1963
Hirayama, T. 1971
Hirokawa, Y. 1823
Hirschhorn, K. 1719
Høeg, K. 1956
Holdcraft, J. 1940
Holmes, J. M. 1784
Holt, P. F. 1723
Hopkins, M. S. 1905
Horne, M. K. 1798
Hoshino, T. 1698
Hsia, David Yi-Yung, 1659
Huebner, R. J. 1831, 1886
Hull, R. N. 1868
Huseby, R. A. 1653
Husson, Y. 1943

Iaunsleinis, E. Ia. 1958
Iavorkovskii, L. I. 1958
Ichimaru, M. 1698
I-Fan Sheh, 1796
Iida, M. 1755
Ikawa, Y. 1823
Ikegami, R. 1837
Imai, K. 1759
Imai, T. 1955
Ingram, R. H., Jr. 1698
Inoue, T. 1950
Inui, N. 1730
Irlin, I. S. 1827
Ito, A. 1695, 1704
Ito, K. 1694
Ito, T. 1704
Itoga, T. 1698
Iurgutis, R. P. 1979
Ivankovic, S. 1727
Iwai, Y. 1756
Izard, C. 1720

Jänisch, W. 1728
Janss, D. H. 1772
Jenkins, T. W. 1902
Jensen, F. 1910
Jensen, J. A. 1870
Jóhannesson, G. 1954
Jones, F. E. 1944
Judah, J. D. 1663
Juhász, S. 1794

Kakita, S. 1929
Kalter, S. S. 1681
Kaplan, H. S. 1889
Kára, J. 1829
Karzel, K. 1966
Kasahara, S. 1856
Kato, K. 1861
Kaump, D. H. 1961
Keen, T. E. B. 1722
Kensler, C. J. 1869
Khokhlova, M. P. 1958
Kia-Jang Wang 1796
Kidwai, J. R. 1862
Kiersnowska, B. 1700
Kiossoglou, K. A. 1982,1987
Kirikae, I. 1936
Kirschstein, R. 1917
Kirsten, W. 1885
Kirsten, W. H. 1821
Kissen, D. M. 1660
Kizer, D. E. 1761
Kleinfeld, M. J. 1668
Kniazeff, A. J. 1678
Koprowski, H. 1908
Korobkin, M. T. 1980
Kosa-Brunet, M. 1803
Koszarowski, T. 1924
Krauss, S. 1983
Krishan, A. 1912
Krivit, W. 1980
Krush, A. J. 1976
Kuff, E. L. 1873
Kühn, H. 1702
Kung, T. 1871
Kuo-Huang Ling 1796
Kurita, Y. 1787

Lafarge, C. 1741
Lagerlöf, B. 1706,1707
Lamberson, H. V. 1897
Landschütz, Chr. 1674
Langham, W. H. 1696
Langlois, A. J. 1819
La Placa, M. 1865
Laqueur, G. L. 1718,1784
Larsen, A. L. 1976
LaSalle, B. 1657
Lasfargues, E. Y. 1901
Lazar, P. 1732
Le Baron-Marano, F. 1720
Leclerc, J. C. 1822
Ledinko, N. 1846,1905
Lee, J. 1978
Leech, J. 1913
Lehmann, L. 1751
Levan, A. 1841
Levenbook, I. S. 1845
Levy, J. A. 1886
Lévy, J. P. 1822
Lewis, G. 1795
Libby, P. 1789
Libermann, C. 1732
Liebelt, A. G. 1791
Liebelt, R. A. 1791
Lieberman, M. 1889
Lijinsky, W. 1742,1749,1762
Lin, J.-K. 1763
Ling-yu Shih 1659
Lippi, L. 1975
Loeffler, H. 1843
London, W. T. 1671
Loosmore, R. M. 1795
Lotlikar, P. D. 1764
Lovino, G. 1970
Lower, G. M., Jr. 1766
Lueders, K. K. 1873
Luginbuhl, R. E. 1676
Lungeanu, A. 1859
Lynch, H. T. 1976

Machiguchi, H. 1835
MacIntyre, E. H. 1807,1852
MacKintosh, T. F. 1977
MacLean, N. 1973
Madoń, J. 1752
Magee, P. N. 1664
Mäkelä, O. 1692
Malanina, V. N. 1958
Malling, H. V. 1797
Manning, J. S. 1898
Mannini-Palenzona, A. 1865
Marcuccio, L. 1760
Markovic, V. 1951
Maruyama, K. 1806,1874
Mashiach, S. 1988
Mason, R. 1913
Matheisz, J. 1914
Matsuba, M. 1756
Matsumoto, S. 1946
Matsushima, T. 1765
Mattern, C. F. T. 1847
Mayeda, K. 1699

Mayer, L. 1885
Mayyasi, S. A. 1875
Mazzarella Farao, O. 1959
McCarthy, C. F. 1926
McCoy, J. 1885
McCullough, J. J. 1980
McGehee, M. P. 1874
McGowan, J. H. 1793
McIntire, K. R. 1767
Medina, D. 1768
Meeker, W. R., Jr. 1904
Meites, J. 1902
Mella, M. 1969
Meloan, S. N. 1769
Meyer-Bertenráth, J. G. 1731
Michot, F. 1757
Miller, E. C. 1763
Miller, J. A. 1763
Miller, R. W. 1687
Minowada, J. 1914
Mirand, E. A. 1879
Miroff, G. 1897
Mitchell, K. G. 1795
Mitus, W. J. 1982,1987
Miyakawa, M. 1927
Miyamoto, M. 1769
Miyata, H. 1699
Mizell, M. 1866
Mobbs, B. G. 1770
Moldow, R. E. 1978
Mondal, S. 1771
Monneron, A. 1741
Montesano, R. 1777
Montgomerie, J. Z. 1800
Moon, R. C. 1772
Moore, A. E. 1685
Moore, D. H. 1896
Moore, G. E. 1914
Mosca, A. 1959
Moscovici, C. 1820
Motomura, S. 1985,1986
Moulton, J. E. 1740
Mouriquand, C. 1834
Mouriquand, J. 1834
Mukherjee, A. L. 1842
Muñoz, N. 1933
Munroe, J. S. 1871
Munson, B. 1877
Munube, G. M. R. 1809
Murano, T. 1950
Mutavdzic, M. 1951
Myers, B. 1805

Nachtigal, M. 1859
Nachtigal, S. 1859
Nadler, H. L. 1659
Nagaki, D. 1851
Nagao, M. 1714
Nagashima, T. 1856
Nagendra, M. 1945
Nakagawa, S. 1835
Nakahara, W. 1811,1812
Nandi, S. 1900
Nasjleti, C. E. 1708
Nell, M. A. 1844
Németh, I. 1794
Newberne, P. M. 1745
Niaussat, P. 1715
Nichols, W. W. 1841
Niculescu-Duvăz, I. 1691
Nielsen, A. H. 1893
Nielsen, G. 1658
Nigro, N. 1803,1857
Nishihara, E. 1704
Nishiyama, H. 1950,1984
Nitze, H. R. 1965
Nordquist, R. E. 1894
North, J. D. K. 1800
Nyfors, A. 1724

Obrzut, D. 1700
O'Connor, T. E. 1891
Oda, K. 1860
Ohwada, Y. 1856
Okada, K. 1927
Old, L. J. 1815
Olson, R. L. 1894
Orlova, L. D. 1958
Osborne, R. H. 1981
Ottenwalder, J. 1715
Oxford, J. S. 1915
Ozer, H. L. 1909

Padeh, B. 1988
Papa, G. 1803
Parker, D. J. 1977
Parkman, R. 1890
Peries, J. 1825
Pernot, C. 1729
Pernot, M. 1729
Petkovic, S. 1951
Petronic, V. 1951
Pezzi, R. 1816
Philips, F. S. 1773
Pialoux, P. 1943
Piatkin, E. K. 1979
Pienta, R. J. 1882
Pierre, O. 1814
Pigache, R. 1729
Piña, M. 1838
Pinus, A. G. 1958
Pitts, J. D. 1916
Placik, B. 1928
Poel, W. E. 1892
Pollara, B. 1801
Pontén, J. 1807,1852
Pope, J. H. 1798
Portolani, M. 1865
Potter, C. W. 1915
Pound, A. W. 1736
Poynter, R. W. 1793
Pradal, G. 1799
Prehn, R. T. 1785
Prestel, E. 1963

Rabotti, G. F. 1830
Radomski, J. L. 1774
Rall, D. P. 1869
Rangan, S. R. S. 1842
Rapp, F. 1656
Rapp, H. J. 1792
Raynaud, J. 1854
Rechcigl, M., Jr. 1718
Restuccia, P. 1760
Reuber, M. D. 1737,1775
Riggs, J. L. 1839
Rightsel, W. A. 1686
Riley, J. F. 1735
Ritter, R. 1900
Robbins, F. C. 1688
Robertson, D. D. 1810
Robertson, D. F. 1703
Robinson, H. L. 1831
Robinson, W. S. 1831
Roger, V. 1956
Rogers, A. E. 1745
Rohlfing, S. R. 1808
Romero, J. J. 1806
Rosa-Brunet, M. 1857
Rosemann, G. 1965
Rosen, R. B. 1984
Rosolini, D. 1930,1931
Ross, A. E. 1762
Roth, D. 1709
Rothblat, G. H. 1717
Rowe, W. P. 1886
Rowson, K. E. K. 1813
Rubin, R. C. 1872
Rudolph, R. 1867
Russell, W. J. 1870

Saffiotti, U. 1777
Sage, H. H. 1709
Sah Sook Cho, 1844
Saito, Y. 1835
Sandison, A. T. 1960
Sanford, K. K. 1683
Sano, S. 1824
Saporoschetz, I. B. 1716
Sardet, C. 1717
Sarkar, N. H. 1901
Sauer, G. 1862
Schardein, J. L. 1961
Schauer, A. 1739
Schidlovsky, G. 1913
Schmähl, D. 1726
Schmid, F. A. 1776
Schreiber, D. 1728
Schulman, J. F. 1883
Schulze, A. 1701
Schwartz, S. O. 1808
Schweid, A. I. 1957
Scott, D. 1884
Scott, W. 1798
Sehrbundt, H.-J. 1964
Seidel, H. J. 1918
Sekiyama, S. 1756
Sellakumar, A. R. 1777
Seman, G. 1802,1805,1895
Senik, A. 1822
Serr, D. M. 1988
Shaki, R. 1988
Shamberger, R. J. 1778

Sharp, J. L. 1754
Sheinin, R. 1850
Shellabarger, C. J. 1779
Shevliagin, V. Ia. 1655
Shibley, G. 1875
Shigeta, S. 1914
Shimizu, K. 1697
Shimojo, H. 1858
Shirley, B. C. 1761
Shumrick, D. A. 1939
Sibal, L. R. 1810,1899
Siegler, R. 1887
Sigel, M. M. 1870
Simpson, W. L. 1780
Sinkovics, J. G. 1876
Sircus, W. 1973
Sivak, A. 1781
Skyring, A. 1934
Slattery, S. 1913
Slemmer, G. L. 1782
Small, C. 1780
Smillie, A. C. 1749
Smith, F. 1800
Smith, J. W. 1906
Smith, K. O. 1690
Smith, W. E. 1783
Snider, G. L. 1928
Soehner, R. L. 1888
Somers, K. D. 1821
Soule, E. H. 1944
Spaeren, U. 1738
Spahn, G. J. 1881
Spatz, M. 1784
Spencer, H. H. 1708
Stackpole, C. W. 1866
Stanton, D. 1892
Steeves, R. A. 1879
Steinmuller, D. 1785
Stenback, W. A. 1710
Sternberg, S. S. 1773,1793
Stevenson, R. E. 1921
Stich, H. F. 1903
Stirpe, F. 1865
Stolfi, R. L. 1870
Strachan, I. M. 1977
Streifler, M. 1758
Streissle, G. 1923
Stroller, F. M. 1941
Stutman, O. 1786
Sugano, H. 1823
Sugimura, T. 1714
Sugiyama, T. 1759,1787
Sunderman, F. W., Jr. 1669
Sushchenko, I. B. 1958
Suss, R. 1713
Sutnick, A. I. 1671
Suzuki, Y. 1835
Swearingen, G. R. 1806
Swetly, P. 1908
Szepsenwol, J. 1788
Szwagrzyk, E. 1948
Szydłowska, H. 1948

Ta-cheng Tung 1796
Taguchi, F. 1851
Takada, M. 1856
Takahashi, I. 1756
Takahashi, T. 1780
Takayama, S. 1730
Takemori, N. 1839
Takemoto, K. K. 1907
Taki, I. 1753
Takizawa, S. 1695
Talas, M. 1855
Tambourin, P. 1814
Tanaka, T. 1693
Tarin, D. 1734
Tawara, K. 1835
Telles, N. C. 1705
Temin, H. M. 1833
Ter-Grigorov, V. S. 1827
Tessmer, C. F. 1882
Thomas, F. B. 1882
Thomson, S. 1880
Thorne, H. V. 1853
Ti Ho 1844
Tiltman, A. J. 1952
Ting, R. C. 1890
Todaro, G. J. 1840,1907,1922
Tokuhata, G. K. 1953
Tokuzen, R. 1811,1812
Tominaga, T. 1789
Toolan, H. W. 1846
Tournier, P. 1863
Toyota, B. 1938
Trentin, J. J. 1710
Tsetlin, E. M. 1845
Tsuchiga, K. 1932
Turner, H. C. 1831
Turner, W. 1884
Tusques, J. 1799

Urbach, F. 1711
Uzman, B. G. 1912

Van Duuren, B. L. 1781
Van Hoosier, G. L., Jr. 1710
Vardi, J. 1758
Varet, B. 1822
Varone, G. L. 1804
Verbo, S. 1719
Vesselinovitch, S. D. 1790
Viala, C. 1834
Vidal, P. M. 1773
Vogt, P. K. 1689,1820
Voiculeț, N. 1691
Voitsekhovskaia, S. G. 1712,1972
Volkova, M. A. 1979
Volm, M. 1713
Voroh'ev, A. I. 1979

Wada, T. 1955
Waldrop, F. S. 1769
Ward, B. C. 1705
Warden, D. 1853
Warren, S. 1654
Warzok, R. 1728
Watanabe, H. 1971
Watanabe, K. 1837
Weisburger, J. H. 1744, 1748,1765
Weiss, E. 1867
Welsch, C. W. 1902
Wendling, F. 1814
Werder, A. A. 1893
Wheeler, E. J. 1791
Wheelock, E. F. 1878
White, J. G. 1801
Williams, A. O. 1942
Wilner, B. I. 1680
Windhorst, D. B. 1801
Witter, R. L. 1677
Wivel, N. A. 1873
Wodinsky, I. 1869
Woods, W. A. 1883
Wright, R. L. 1974

Yamamoto, R. S. 1744
Yamamoto, S. 1699
Yamane, Y. 1856
Yazdi, E. 1783
Yerganian, G. 1844
Yohn, D. S. 1903,1904
Yokoro, K. 1695,1704
Yokoshima, T. 1714
Yoshida, O. 1927
Yoshida, T. O. 1759
Yoshikura, H. 1823
Youn, J. K. 1818

Zaitseva, M. V. 1958
Zajdęla, F. 1814
Zaldívar, R. 1969
Zbar, B. 1792
Zedeck, M. S. 1793
Zelickson, A. S. 1801
Zironi, A. 1673

SUBJECT INDEX

ABNORMALITIES, CONGENITAL (See also under Teratogenesis)
  aniridia, Wilms' tumor, child: 1977
ACETAMIDE (See also N-2-Fluorenylacetamide)
  hepatoma, effect of arginine glutamate, rat: 1744
2-ACETYLAMINOFLUORENE (See N-2-Fluorenylacetamide)
ACROLEIN
  cigarette smoke, mutagenesis, algae: 1720
AFLATOXIN(S)
  effect on
    nuclear ultrastructure, rat liver: 1741
    nucleic acids and protein, rat liver: 1742
  toxicity, interaction with dietary copper, swine: 1795
    serum proteins, duckling: 1794
AFLATOXIN B-1
  analysis, peanut products, Taiwan: 1796
  effect on ultrastructure, rat liver: 1746
  toxicity, liver, rat: 1745
      swine: 1740
AIR POLLUTION
  lung cancer, Japan (Tokyo): 1929
ALCOHOL
  consumption, liver tumors, Japan: 1935
    upper respiratory cancer, Hungary: 1937
AMINES, AROMATIC
  bladder, stomach or liver tumors, hamster: 1777
AMINO ACID PEPTIDES
  arginine glutamate, effect on acetamide hepatoma, rat: 1744
AMYLOIDOSIS
  virus, and plasma cell leukemia virus, mouse: 1672
ANTICONVULSANTS
  Hodgkin's disease: 1758
ANTITUMOR AGENTS
  actinomycin D, effect on DNA, SV40-infected cells: 1861
  effect on Rauscher virus leukemia, mouse: 1918
ARSENIC
  occupational exposure, nasal septum perforation with cancer: 1729
ASBESTOS
  lung inclusions, pathogenesis, guinea pig: 1723
    tumors, mouse: 1783
  nickel content, significance, review: 1669
  occupational exposure, cancer risk, review: 1668
AZOBENZENE, 4-DIMETHYLAMINO-
  premalignant liver lesion, nucleotide deaminase, rat: 1761
AZOBENZENE, 4-METHYLDIMETHYLAMINO-
  premalignant liver lesion, nucleotide deaminase, rat: 1761
AZOBENZENE, N-METHYL-4-AMINO-
  liver metabolism, polar dye formation, rat: 1763
AZOBENZENE, 3'-METHYL-4-METHYLAMINO-
  hepatoma, cytoplasmic fibrils, rat: 1769

AZOXYMETHANOL, METHYL- (See Cycasin aglycone)

BACTERIOPHAGE
  induction, index of carcinogenic activity, nitroquinoline series: 1716
BENZ(a)ACRIDINE DERIVATIVES
  skin toxicity, bioassay, mouse: 1732
BENZ(c)ACRIDINE DERIVATIVES
  skin toxicity, bioassay, mouse: 1732
BENZANTHRACENE, 1:2,5:6-DI-
  skin tumors, mouse: 1736
BENZANTHRACENE, 7,12-DIMETHYL-
  cytotoxicity and effect on DNA, rat tissues: 1773,1789
  hepatoma, mouse: 1725,1736
  leukemia
    autoimmunity, rat: 1759
    karyotype, rat: 1787
    strain differences, mouse: 1725
  lung tumors, strain differences, mouse: 1725
  mammary tumors
    effect of propylthiouracil, rat: 1779
      sex hormones, rat: 1780
    estrogen uptake, rat: 1770
  metabolism, normal, transformed or tumor cells: 1717
  skin tumors, mouse: 1731,1735,1736,1776,1778
  uptake, rat mammary gland: 1772
BENZANTHRACENE, 7,8,12-TRIMETHYL-
  leukemia, karyotype, rat: 1787
3,4-BENZPYRENE
  biosynthesis, marine organisms: 1715
  skin tumors, effect of polyethylene extracts, mouse: 1733
BILIARY TRACT NEOPLASMS
  epidemiology, Poland: 1924
  husband and wife, smoking: 1926
BLADDER CARCINOGENESIS
  aromatic amines, hamster: 1777
  tryptophan, preneoplastic lesions, dog: 1774
  xanthurenic acid 8-methyl ether, mouse: 1766
BLADDER NEOPLASMS
  epidemiology, "Balkan nephritis" areas, Yugoslavia: 1951
    Japan, smoking: 1927,1932
BLOOD
  coagulation activator (ellagic acid), tumor stimulation, rat: 1760
BONE MARROW DISEASES (See also under Leukemia)
  acute myelofibrosis, karyotype: 1987
BRAIN NEOPLASMS
  epidemiology, Ceylon: 1949
  familial hemangioblastoma (von Hippel-Lindau's syndrome): 1974
  foreign body-induced meningioma and hormone-stimulated ependymoma, adolescent: 1701
  glioma, cell cultures: 1807
    epidemiology, Poland (Cracow): 1948
  induction
    ethylnitrosourea, fetal rat and hamster: 1727
    methylnitrosourea, rat: 1728
    Rous sarcoma virus, puppy: 1869
    simian adenovirus (SA7 group), hamster: 1845

- BRAIN NEOPLASMS (Contd.)
  - medulloblastoma and glioblastoma, cytometry: 1964
  - methylcholanthrene-induced ependymoblastoma, virus-like particles, mouse: 1872
  - pinealoma and craniopharyngioma, epidemiology, Japan: 1946
- BREAST NEOPLASMS (See under Mammary neoplasms, human)
- BURKITT LYMPHOMA VIRUS (See under Virus, herpes-type)

- CARBAMATE DERIVATIVES (See also under Urethan)
  - cocarcinogenesis, mechanism, mouse skin: 1736
- CARBON TETRACHLORIDE
  - + methylcholanthrene, liver cirrhosis and hepatic vein thrombosis, rat: 1737
- CARCINOGENESIS, CHEMICAL (See also under Radiation and Viral carcinogenesis)
  - hormone effects, mouse, review: 1695
  - nickel, review: 1669
  - nitroquinoline series, relationship to phage-inducing activity: 1716
  - tumor karyotype, animal, review: 1693
- CARCINOGENS (CHEMICAL)
  - interaction with nucleic acids, review: 1691
  - mechanism of action, review: 1666
  - mutagenesis, hamster cells *in vitro*: 1797
  - toxicity, liver, mechanism, review: 1663
- CATIONS
  - effect on mouse sarcoma virus *in vitro*: 1821
- CELL GROWTH KINETICS
  - avian sarcoma virus-transformed cells: 1833
  - breast cancer, mathematical model: 1967
  - dimethylaminostilbene-induced ear duct tumors, rat: 1965
  - Ehrlich carcinoma cells *in vitro*: 1966
- CENTRAL NERVOUS SYSTEM NEOPLASMS (See under Brain neoplasms)
- CERVIX UTERI NEOPLASMS
  - epidemiology
    - and cervix ulceration, Japan: 1955
    - follow-up study, Norway: 1956
    - Iceland: 1954
    - Poland: 1924
    - Washington (Seattle), ethnic groups: 1957
  - induction
    - contraceptives, human, review: 1662
    - methylcholanthrene, hormone effects, mouse: 1753
      - pathogenesis, mouse: 1755
  - karyometry, method: 1963
  - polyps, induction, contraceptives, human: 1754
- CHLORAMPHENICOL
  - leukemogenesis, human, review: 1667
- CHROMIUM
  - occupational exposure, lung cancer, Japan: 1932
    - nasal septum perforation with cancer: 1729
- CHROMOSOMES
  - abnormalities
    - human leukemia: 1980,1983,1985,1986

- CHROMOSOMES (Contd.)
  - abnormalities
    - familial mongolism: 1978
    - WBC alkaline phosphatase: 1659,1982,1984
    - LSD users and their children: 1719
  - dimethyl- or trimethylbenzanthracene-induced rat leukemia: 1787
  - human tumors, review: 1659,1693
  - induced animal tumors, review: 1693
  - markers, acute myelofibrosis: 1987
    - virus-infected cells, review: 1675
  - radiation-treated human cancer: 1708
  - sex, ovarian teratoma or trophoblastic tumors: 1988
  - SV40-induced hamster tumors: 1859
  - tumor virus-infected normal cells: 1841
- COCARCINOGENESIS (CHEMICAL) (See also under Carcinogenesis, chemical)
  - croton oil fractions, mechanism, mouse skin: 1735
  - mechanism, mouse skin or liver: 1736
  - polyethylene extracts, benzpyrene-induced skin cancer, mouse: 1733
  - tryptophan, bladder, dog: 1774
- COCARCINOGENS (CHEMICAL)
  - phorbol esters (croton oil), isolation method: 1731
- COLON NEOPLASMS
  - "cancer family" syndrome: 1976
- CONNECTIVE TISSUE NEOPLASMS
  - benign fibrous xanthoma of synovium, joint disease and/or injury: 1944
  - liposarcoma, head and neck, epidemiology, England: 1941
  - malignant synovioma, epidemiology, Ceylon (Colombo): 1945
- COPPER
  - effect on aflatoxin toxicity, swine: 1795
  - serum, effect of leukemia or sarcoma virus, mouse: 1882
- CORPUS UTERI NEOPLASMS
  - endometrium, "cancer family" syndrome: 1926
    - induction, contraceptives, human, review: 1662
  - hydatidiform mole or choriocarcinoma, sex chromatin: 1988
  - induction, methylcholanthrene, hormone effects, mouse: 1753
  - radiation leukemogenesis: 1699
- CROTON OIL
  - cocarcinogenesis, mechanism, mouse skin: 1735, 1736
  - phorbol esters, effect on nuclear RNA, mouse fibroblasts: 1781
    - isolation and screening, mouse skin: 1731
  - skin injury, nuclear DNA, mouse: 1730
- CYCASIN
  - effect on liver catalase, rat: 1718
- CYCASIN AGLYCONE (methylazoxymethanol)
  - distribution and toxicity, mouse or rat: 1793
  - liver and g.i. tumors and teratogenesis, hamster: 1784

- DIETARY FACTORS
  - cancer epidemiology, tropical Africa, review: 1661

IETARY FACTORS (Contd.)
- liver tumors, Japan: 1935

ISTRIBUTION
- cycasin aglycone, mouse or rat: 1793

RUG ADDICTION
- phenacetin, kidney cancer, human: 1751
- LSD, chromosome abnormalities, mothers and children: 1719

AR DUCT NEOPLASMS
- dimethylaminostilbene-induced, growth kinetics, rat: 1965

B VIRUS (See under Virus, herpes-type)

LLAGIC ACID
- tumor stimulation, rat: 1760

NDOCRINE ABLATION
- effect on
  - fluorenyldiacetamide hepatoma, rat: 1775
  - liver carcinogenesis, rat, review: 1665
  - methylcholanthrene cervix or uterus cancer, mouse: 1753
- oophorectomy, effect on estrogen uptake, DMBA-induced mammary tumors, rat: 1770

NVIRONMENTAL FACTORS
- "Balkan nephritis" syndrome and urothelial tumors, Yugoslavia: 1951
- cancer epidemiology, tropical Africa, review: 1661
- seasonal variations in birth rates of cancer pts., Northern Hemisphere and Australia: 1925
- stomach cancer and peptic ulcer: 1934

NZYMES
- alkaline phosphatase, human leukemia: 1659, 1982,1983,1984
- carbohydrate-mobilizing, induced liver tumors, rat: 1739
- catalase, effect of cycasin, rat liver: 1718
- DNA polymerase, binding to polyoma virus DNA: 1916
- induction, Rous sarcoma virus-infected cells: 1829
- nucleoside- and nucleotide-mobilizing, induced liver tumors, rat: 1738,1739,1761
- thymidine kinase, Shope fibroma virus-infected human cells: 1865

EPIDEMIOLOGY
- all tumors
  - offspring of women with breast cancer: 1953
  - Poland: 1924
  - relatives of children with leukemia: 1979
  - seasonal variations, Northern Hemisphere and Australia: 1925
  - tropical Africa, review: 1661
- ameloblastoma of jaw, Nigeria, oral hygiene: 1942
- biliary tract cancer, husband and wife: 1926
- bladder cancer, Japan, smoking: 1927,1932
  - Yugoslavia, "Balkan nephritis" areas: 1951

EPIDEMIOLOGY (Contd.)
- bovine and human leukemia, Latvian SSR: 1958
- brain tumors, Ceylon: 1949
  - Poland (Cracow): 1948
- cervix cancer
  - Iceland: 1954
  - Japan, and cervix ulceration: 1955
  - Norway: 1956
  - Washington (Seattle), ethnic groups: 1957
- dysembryoplastic spinal cord tumors, Rumania (Bucharest): 1947
- ear-nose-throat tumors, smoking and occupation, Hungary: 1937
- female genital tumors, veterinary (cattle, sheep, swine), Great Britain: 1960
- head and neck cancer, Japan (Toyama Prefecture): 1938
  - liposarcoma, England: 1941
- larynx cancer, smoking, Japan: 1936
  - TB, Italy: 1970
- leukemia
  - Japan, Hiroshima and Nagasaki: 1697,1698
    - Tokai Province: 1950
  - USSR, ethnic groups (Russians and Jews): 1980
- liver tumors, Japan, smoking and diet: 1935
- lung cancer
  - air pollution, Japan: 1929
  - alcohol consumption, Hungary: 1337
  - Italy: 1930,1931,1959
  - Japan: 1929,1932
  - nickel exposure, review: 1669
  - occupation: 1669,1932
  - smoking: 1932,1959
- malignant synovioma, Ceylon (Colombo): 1945
- melanoma of nasal and paranasal sinus mucosa, cases and review: 1940
- minor salivary gland tumors, Iowa: 1939
- oropharynx and intestine cancer, Chile: 1969
- pinealoma and craniopharyngioma, Japan: 1946
- renal pelvis and ureter tumors, "Balkan nephritis" areas, Yugoslavia: 1951
- radiation-induced leukemia, treated breast or uterus cancer: 1699
- serum SV40 antibodies, adults and children, Italy, polio vaccination: 1857
  - African or Asiatic monkeys: 1856
- skin cancer, UV levels in sunlight, Australia: 1703
- spontaneous tumors, Sprague-Dawley rats: 1961
- stomach cancer
  - environmental and socioeconomic factors: 1934
  - smoking and occupation, Japan: 1932
  - tumor histology, Mexico City and Colombia: 1933
- testis tumors, South Africa (Cape Town), ethnic groups: 1952
- thyroid cancer, goiter region, Madagascar: 1943
  - review: 1694

EPILEPSY
- Hodgkin's disease complicating anticonvulsant therapy: 1758

ETHIONINE
- effect on radiation carcinogenesis, mammary gland, rat: 1705

ETHIONINE (Contd.)
- hepatoma, cytoplasmic fibrils, rat: 1769

ETHNIC GROUPS
- cervix cancer, Washington (Seattle): 1957
- chronic leukemia, USSR: 1980
- testis tumors, South Africa (Cape Town): 1952

EYE
- aniridia, Wilms' tumor, case: 1977

N-2-FLUORENYLACETAMIDE
- liver tumors, nucleotide-mobilizing enzymes, rat: 1738

N-2-FLUORENYLACETAMIDE, N-HYDROXY-
- hepatoma, effect of pituitary hormones, rat: 1748
- liver metabolism, sex difference, rat: 1764
  - specific inhibition, rat: 1765

N-2-FLUORENYLDIACETAMIDE
- hepatoma, effect of hormones, rat: 1775

FOODS
- peanut products, aflatoxin content, Taiwan: 1796

GASTROINTESTINAL CARCINOGENESIS
- aromatic amines, hamster: 1777
- cycasin aglycone, hamster: 1784
- method, rat: 1750
- methylcholanthrene, mouse: 1791
- nitrosoaniline derivative, rat: 1749

GASTROINTESTINAL NEOPLASMS
- epidemiology, Chile: 1969

GENETICS, ANIMAL
- Aleutian disease of mink, viral lymphoma-like disease: 1801
- mammary tumor virus susceptibility, mouse: 1837

GENETICS, CELLULAR
- effect of carcinogens, review: 1666
- resistance to avian myeloblastosis virus (BAI strain A): 1820

GENETICS, HUMAN
- "cancer family" syndrome: 1976
- cancer incidence, offspring of women with breast cancer: 1953
  - relatives of children with leukemia: 1979
- Chediak-Higashi anomaly, possible virus-induced lymphoma: 1801
- familial cancer, cases and review: 1901,1975
- hemangioblastoma (von Hippel-Lindau's syndrome) familial: 1974
- high-cancer-risk diseases, adenovirus-12 or SV40 susceptibility, cell culture: 1840, 1922
- larynx cancer, familial: 1975
- leukemia in twins, immunology: 1981
- mongolism and leukemia: 1978

GENETICS, MICROBIAL
- adenovirus-12 mutants, properties: 1839

GENETICS, POPULATION
- mathematical model: 1962

GENITAL NEOPLASMS, FEMALE
- epidemiology, veterinary (cattle, sheep, swine), Great Britain: 1960

HALLUCINOGENS,
- LSD, prenatal exposure, chromosome abnormalities: 1719

HEAD AND NECK NEOPLASMS, ear-nose-throat, smoking,
- alcohol consumption and occupation, Hungary: 1937
- epidemiology, Japan (Toyama Prefecture): 1938
- liposarcoma, epidemiology, England: 1941
- nasal and paranasal sinus mucosa melanoma, incidence, cases and review: 1940
- smoking, Japan: 1936

HORMONES
- anabolic, plasmacytoma: 1757
- contraceptive
  - breast cancer, human: 1662
  - cervix cancer or polyps: 1662,1754
  - effect on radiation-induced ovary tumor, rat: 1756
- effect on
  - avian sarcoma virus sensitivity, monkey: 1871
  - chemical, radiation or viral carcinogenesis, mouse, review: 1695
  - fluorenyldiacetamide hepatoma, rat: 1775
- estrogen, binding, effect of methylcholanthrene,
  - rat uterus: 1752
  - metabolism, regressing DMBA-induced mammary tumor, rat: 1770
- interaction with liver carcinogens, rat, review: 1665
- metabolic status, breast cancer: 1971
- neuroendocrine factors, human cancer, review: 1660
- pituitary, effect on hydroxyfluorenylacetamide
  - liver carcinogenesis, rat: 1748
    - mammary tumor development, virus-positive or -negative mouse strains: 1902
- sex
  - effect on DMBA mammary tumors, rat: 1780
    - hydroxyfluorenylacetamide metabolism, rat: 1764
    - methylcholanthrene cervix and uterus cancer, mouse: 1753
  - stimulation of brain tumor, adolescent: 1701

IMMUNITY
- adjuvant, stimulation of Rous or polyoma virus, mouse or rat: 1827
- "Australia antigen,"human leukemia, review: 1671
- CELO (chick embryo lethal orphan) virus-induced tumor: 1915
- diethylnitrosamine hepatoma, antigenic specificity, guinea pig: 1792
- Gross virus leukemia (mouse), review: 1673
- human cancer, review: 1692
- methylcholanthrene mammary tumors, mouse: 1782

MMUNITY (Contd.)
- methylcholanthrene (Contd.)
  - resistant mouse: 1786
- Moloney virus leukemia or sarcoma, mouse: 1822
- natural, Rous sarcoma virus, chicks: 1870
- serum hemagglutinins and virus-like particles, leukemia: 1803
- skin graft survival, hamster with adenovirus 12-induced tumor: 1904
- transplantation, Kirsten virus sarcoma, mouse: 1885
  - SV40-infected monkey or hamster cell lines: 1910

MMUNITY DISORDERS
- autoimmunity, dimethylbenzanthracene leukemia, rat: 1751
- tonsillectomy and leukemia, twins: 1981

MMUNOSUPPRESIVE AGENTS
- herpes infection with lymphoma, complication of kidney graft therapy, human: 1800

NJURIES (See also under Scar tissue)
- joints, fibrous xanthoma of synovium: 1944
- larynx, larynx cancer, human: 1712,1972
- skin, chemical or thermal, nuclear DNA, mouse: 1730

NTERFERON
- effect on Moloney sarcoma virus *in vitro*: 1825
- induction (Statolon), effect on Friend virus leukemogenesis, mouse: 1878

NTESTINE, SMALL, NEOPLASMS
- lymphoma, and malabsorption syndrome: 1973

SONICOTINIC ACID HYDRAZIDE
- lupus vulgaris, cancer incidence: 1724

AW NEOPLASMS
- epidemiology, Nigeria, oral hygiene: 1942

OINT DISEASES
- degenerative, and fibrous xanthoma of synovium: 1944

IDNEY
- Gross viral leukemia, pathology, mouse: 1816

IDNEY CARCINOGENESIS
- phenacetin addiction, human: 1751

IDNEY DISEASES
- "Balkan nephritis," and kidney or ureter cancer, Yugoslavia: 1951

IDNEY NEOPLASMS
- epidemiology, "Balkan nephritis" areas, Yugoslavia: 1951
- Wilms' tumor (Nephroblastoma), non-familial aniridia: 1977
  - papovavirus-like particles, child: 1906

ARYNX NEOPLASMS
- epidemiology, smoking, Japan: 1936
- familial (siblings, cousins, father and son), smoking: 1975
- papilloma, malignant transformation: 1972
- predisposing causes, USSR: 1972
- prognosis, TB, Italy: 1970
- scar tissue, human: 1712,1972

LARYNX NEOPLASMS (Contd.)
- smoking, alcohol consumption and occupation, Hungary: 1337

LASIOCARPINE
- effect on nuclear ultrastructure, rat liver: 1741
- mechanism of action, rat liver mitochondria: 1747

LEUKEMIA, EXPERIMENTAL (See also under Virus, leukemia/lymphoma)
  - Rauscher (mouse), chemotherapy: 1918

LEUKEMIA, HUMAN
- "Australia antigen," review: 1671
- bone marrow *Mycoplasma*: 1804
- children, cancer incidence in relatives: 1979
- chronic myeloid, chromosomes: 1980,1982,1983, 1984,1985,1986
  - WBC alkaline phosphatase: 1659,1982,1983, 1984
- epidemiology
  - Japan, Hiroshima-Nagasaki: 1697,1698
    - Tokai Province: 1950
  - Latvian SSR, bovine leukosis areas: 1958
  - offspring of women with breast cancer: 1953
  - USSR, ethnic groups (Russians and Jews): 1980
- familial mongolism: 1978
- radiation-induced, breast cancer: 1699,1700
  - uterus cancer: 1699
- tonsillectomy, twins: 1981
- virus-like particles: 1798,1802,1803,1874, 1912,1914

LEUKEMOGENESIS, EXPERIMENTAL (See also under Radiation leukemogenesis and Virus, leukemia/lymphoma)
- corn oil, lymphosarcoma, mouse: 1788
- dimethylbenzanthracene, rat: 1759,1787
  - strain differences, mouse: 1725
- mineral oil (plasma cell tumors), germfree mouse: 1767
- nitrosohexamethyleneimine, rat: 1726
- trimethylbenzanthracene, karyotype, rat: 1787
- xanthurenic acid 8-methyl ether, mouse: 1766

LEUKEMOGENESIS, HUMAN
- anabolic hormone (muscular dystrophy), plasmacytoma: 1757
- anticonvulsants, Hodgkin's disease: 1758
- chloramphenicol, mechanism, review: 1667
- immunosuppressive therapy (kidney graft), lymphoma: 1800

LEUKOSIS (LEUKEMIA), AVIAN
- MC29, classification of virus: 1819
- possible vaccine transmission, review: 1657

LEUKOSIS, AVIAN, MAREK TYPE (See under Marek's disease)

LEUKOSIS (LEUKEMIA), BOVINE
- epidemiology, Latvian SSR: 1958

LIVER
- carbohydrates, diethylnitrosamine carcinogenesis, rat: 1739
- catalase, effect of cycasin, rat: 1718
- metabolism, azobenzene derivative, rat: 1763
  - hydroxyfluorenylacetamide, rat: 1764,1765
- nucleic acids and proteins, effect of aflatoxins and nitrosamines, rat: 1742
- toxicity

- LIVER (Contd.)
  - toxicity (Contd.)
    - aflatoxin, rat: 1745
      - swine: 1740
    - carcinogenic or non-carcinogenic chemicals, mechanism, review: 1663
    - pyrrolizidine alkaloid, rat: 1747
  - ultrastructure, effect of carcinogens or toxic chemicals, rat: 1741,1746
- LIVER CARCINOGENESIS
  - acetamide, effect of arginine glutamate, rat: 1744
  - aromatic amines, hamster: 1777
  - carcinogen toxicity, mechanism, review: 1663
  - cycasin aglycone, hamster: 1784
  - cyclic N-nitrosamines, mechanism, rat: 1762
  - diethylnitrosamine
    - enzymes, rat: 1739
    - tumor antigens, guinea pig: 1792
  - dimethylaminoazobenzene
    - nucleotide deaminase, rat: 1761
  - dimethylbenzanthracene
    - mouse: 1736
    - strain differences, mouse: 1725
  - dimethylnitrosamine, sex difference, rat: 1790
  - ethionine + azobenzene derivative, cytoplasmic fibrils, rat: 1769
  - fluorenylacetamide, nucleotide-mobilizing enzymes, rat: 1738
  - fluorenyldiacetamide, effect of hormones, rat: 1775
  - hormone interactions, rat, review: 1665
  - hydroxyfluorenylacetamide, effect of pituitary hormones, rat: 1748
  - nitrosohexamethyleneimine, rat: 1726
  - nitrosomorpholine, pathogenesis, rat: 1743
  - pathogenesis, review (book): 1743
  - ^{232}Th (Thorotrast), human: 1935
  - urethan, mouse: 1736
- LIVER DISEASES
  - cirrhosis and hepatic vein thrombosis, CCl_4 + methylcholanthrene, rat: 1737
- LIVER NEOPLASMS
  - epidemiology, Japan, smoking and diet: 1935
- LSD (See under Hallucinogens)
- LUCKÉ VIRUS (See under Virus, herpes-type)
- LUNG
  - asbestos bodies, pathogenesis, guinea pig: 1723
  - scar tissue, particle uptake, rat: 1721
  - toxicity, petroleum distillates, rat: 1722
- LUNG CARCINOGENESIS
  - asbestos, mouse: 1783
  - corn oil, mouse: 1788
  - dimethylbenzanthracene, strain differences, mouse: 1725
  - methylcholanthrene, mouse: 1791
  - nickel, review: 1669
  - radioactive particles, mathematical model: 1696
- LUNG DISEASES
  - tuberculosis, bronchogenic carcinoma: 1928
    - larynx cancer, Italy: 1970
- LUNG NEOPLASMS
  - epidemiology
    - Italy: 1930,1931,1959
- LUNG NEOPLASMS (Contd.)
  - epidemiology (Contd.)
    - Japan (Tokyo), air pollution: 1929
    - Poland: 1924
  - occupational hazards: 1337,1932
  - particle uptake in scar tissue, rat: 1721
  - scar tissue: 1702
  - smoking: 1337,1932,1959
  - TB: 1928
- LYMPHOMA, MALIGNANT, EXPERIMENTAL
  - Aleutian disease of mink, genetics: 1801
  - induction, nitrosohexamethyleneimine, rat: 1726
  - radiation-induced, virus-like particles, hamster: 1710
- LYMPHOMA, MALIGNANT, HUMAN
  - Burkitt's, cell lines, virus detection method: 1914
  - Chediak-Higashi anomaly (genetic), possible virus induction: 1801
  - epidemiology, offspring of women with breast cancer: 1953
  - Hand-Schüller-Christian disease, virus-like particles, child: 1799
  - with herpes simplex infection, complication of immunosuppression (kidney graft): 1800
  - Hodgkin's disease, anticonvulsant-treated epilepsy: 1758
  - IgD plasmacytoma, anabolic steroid-treated muscular dystrophy: 1757
  - small intestine, and malabsorption syndrome: 1973
  - virus-like particles: 1802

- MALABSORPTION SYNDROME
  - and lymphoma of small intestine: 1973
- MALIGNANT TRANSFORMATION
  - goiter to thyroid cancer: 1943
  - larynx papilloma to carcinoma: 1972
  - malabsorption syndrome and intestineal lymphoma: 1973
- MAMMARY CARCINOGENESIS, EXPERIMENTAL (See also under Virus, mammary tumor)
  - corn oil, mouse: 1788
  - dimethylbenzanthracene
    - effect of propylthiouracil, rat: 1779
      - sex hormones, rat: 1770,1780
  - methylcholanthrene
    - tumor antigenicity, mouse: 1782
      - transplantation, mouse: 1768
  - radiation, effect of ethionine, rat: 1705
- MAMMARY CARCINOGENESIS, HUMAN
  - contraceptives, review: 1662
- MAMMARY GLAND
  - dimethylbenzanthracene uptake, rat: 1772
  - DNA, effect of carcinogen, rat: 1789
- MAMMARY NEOPLASMS, EXPERIMENTAL
  - hybrid mouse strains: 1892
- MAMMARY NEOPLASMS, HUMAN
  - cancer morbidity and mortality in offspring: 1953
  - epidemiology
    - children of women with breast cancer: 1953
    - Poland: 1924
  - growth rate, mathematical model: 1967
  - radiation leukemogenesis: 1699,1700
  - relative risk, hormone metabolism: 1971

AMMARY NEOPLASMS, HUMAN (Contd.)
- virus-like particles: 1805,1895

AREK'S DISEASE (See also under Leukosis, avian)
- herpes-type virus: 1913

AREK'S DISEASE VIRUS (See under Virus, herpes-type)

AST CELL NEOPLASMS
- virus-like particles, dog: 1867

ETABOLISM (glycolysis and respiration)
- effect of carcinogens, normal cells: 1713,1747

ETHANOL, METHYLAZOXY- (See Cycasin aglycone)

-METHYLCHOLANTHRENE
- brain tumor, virus-like particles, mouse: 1872
- + CCl_4, liver cirrhosis and hepatic vein thrombosis, rat: 1737
- cervix or uterus cancer, mouse: 1753,1755
- effect on estrogen binding, rat uterus: 1752
- malignant transformation, single-cell prostate culture, rat: 1771
- mammary tumors, mouse: 1768,1782
- multiple tumors, mouse: 1791
- resistance, host immunity, mouse: 1786
- skin tumors, mouse: 1730,1734,1778
- stomach tumors, induction method, rat: 1750
- toxicity, monkey: 1785

OUTH
- mucosa, photochemical repair, smoking: 1709

OUTH NEOPLASMS
- adenovirus antigens: 1842

UTAGENESIS
- carcinogens, hamster cells: 1797
- tobacco smoke component (acrolein), algae: 1720
- viral, human WBC cultures: 1841

ycoplasma
- isolation, bone marrow, human leukemia: 1804

ASOPHARYNX NEOPLASMS
- induction, nitrosohexamethyleneimine, rat: 1726
- tumor growth rate and survival rates: 1968

EOPLASMS, EXPERIMENTAL
- comparison with human tumors, review: 1653
- Ehrlich carcinoma (mouse), growth rate *in vitro*: 1966
- I.R.E. reticulum cell sarcoma (rat), stimulation by blood coagulation activator: 1760
- NTF reticulum cell sarcoma (mouse), Friend leukemia virus content: 1811
- NTF sarcoma (mouse), effect on Friend virus leukemia: 1812
- P4 *bis* (mouse), attenuation by leukemia virus: 1817
- rat or mouse, vaccine production and tumor induction: 1868
- Sarcoma 180 or Ehrlich carcinoma (mouse), mixed with mammary tumor, mammary tumor virus propagation: 1835
- spontaneous, incidence, Sprague-Dawley rat: 1961

EOPLASMS, HUMAN
- asbestos exposure, review: 1668
- chromosomal damage after radiotherapy: 1708
- epidemiology
  - Poland: 1924

NEOPLASMS, HUMAN (Contd.)
  - seasonal variations, Northern Hemisphere and Australia: 1925
  - tropical Africa, review: 1661
- experimental models, review: 1653
- immunology, review: 1692
- isoniazid-treated lupus vulgaris: 1724
- karyotype, review: 1693
- multiple primary, "cancer family" syndrome: 1976
- personality patterns and neuroendocrine factors, review: 1660
  - viral vaccines, review: 1687,1688,1689
- virus-like particles, comparison to mouse or cat leukemia viruses: 1874

NICKEL
- occupational exposure, lung cancer, Japan: 1932
- respiratory cancer, review: 1669

NITROQUINOLINE DERIVATIVES
- phage induction as index of carcinogenic activity: 1716

NITROSAMINE DERIVATIVES
- cyclic, liver tumors, mechanism of action, rat: 1762
- effect on nucleic acids and protein, rat liver: 1742
- mechanism of action, review: 1664

NITROSAMINE, DIETHYL-
- hepatoma, antigenic specificity, guinea pig: 1792
  - enzymes, rat: 1739
- mechanism of action, normal cells: 1713

NITROSAMINE, DIMETHYL-
- effect on ultrastructure, rat liver: 1746
- hepatoma, sex difference, rat: 1790

p-NITROSO-N,N-DIMETHYLANILINE
- g.i. and other tumors, rat: 1749

N-NITROSOGUANIDINE, N-METHYL-N'-NITRO-
- reaction with DNA and protein, cell-free systems: 1714

N-NITROSOHEXAMETHYLENEIMINE
- liver and other tumors, rat: 1726

N-NITROSOMORPHOLINE
- hepatoma, pathogenesis, rat: 1743

NITROSOPIPERAZINE, 1,4-DI-
- mechanism of action, normal cells: 1713

NITROSOUREA, ETHYL-
- transplacental CNS carcinogenesis and teratogenesis, rat and hamster: 1727

N-NITROSOUREA, N-METHYL-
- CNS and peripheral nerve tumors, rat: 1728
- mechanism of action, normal cells: 1713

N-NITROSOURETHAN, N-ETHYL-
- mechanism of action, normal cells: 1713

NUCLEIC ACIDS, DNA
- chemical or thermal skin injury, mouse: 1730
- effect of
  - aflatoxin, rat liver: 1742,1745
- carcinogens, review: 1666,1691
  - dimethylbenzanthracene, rat tissues: 1773,1789
  - nitrosamines, mechanism, review: 1664
    - normal cells: 1713,1742,1762
- human and simian adenoviruses, composition: 1838
- methylcholanthrene skin tumors, mouse: 1730

NUCLEIC ACIDS, DNA (Contd.)
  mitochondrial, virus-induced hamster tumors, comparison to viral (polyoma or SV40) DNA: 1848
  nitrosoguanidine derivative binding, cell-free systems: 1714
  polyoma virus, properties: 1849,1850,1853,1916
  radiation-induced thymoma, mouse: 1707
  replication, myeloid leukemia: 1986
  Rous sarcoma virus-infected cells: 1829
  SV40-infected cells, effect of actinomycin: 1861
NUCLEIC ACIDS, RNA
  effect of
    aflatoxins, rat liver: 1742
    carcinogens, review: 1666,1691
    croton oil esters, mouse fibroblast nuclei: 1781
    nitrosamines or nitrosamides, normal cells: 1713,1742
  Friend leukemia virus-infected mouse spleen: 1877
  mouse mammary tumor virus, structure: 1836
  nucleolar, effect of carcinogens, rat liver: 1741
  SV40-infected cells: 1860
NUCLEOSIDES AND NUCLEOTIDES
  enzymes mobilizing, liver carcinogenesis, rat: 1738,1739,1761

OCCUPATIONAL DISEASES
  asbestos exposure, cancer risk, review: 1668
  chromium exposure, lung cancer, Japan: 1932
  glass components (including arsenic and chromium), nasal septum cancer: 1729
  nickel exposure, lung cancer, Japan: 1932
    review: 1669
  radiation carcinogenesis, review: 1254
  stomach cancer, Japan: 1932
  tobacco and chemical exposure, ear-nose-throat cancer, Hungary: 1937
  tobacco and industrial chemicals, upper respiratory cancer, Hungary: 1337
OIL, MINERAL
  (See also under Petroleum)
  plasma cell tumors, germfree mouse: 1767
OIL, PLANT
  corn, lung and other tumors, mouse: 1788
OVARY NEOPLASMS
  radiation-induced, effect of hormones, rat: 1756
  teratoma (dermoid cyst), sex chromatin: 1988

PARAFFIN
  skin tumors, relationship to inflammation, mouse: 1776
Penicillium statolonum EXTRACT (Statolon)
  effect on Friend virus leukemogenesis, mouse: 1878
PETROLEUM
  distillates, lung toxicity, rat: 1722
PHARYNX NEOPLASMS
  adenovirus antigens: 1842
PHENACETIN
  addiction, kidney cancer, human: 1751
PHORBOL ESTERS (See under Croton oil)
PITUITARY NEOPLASMS
  hybrid mouse strains: 1892
PLASTICS
  commercial polyethylene, effect on benzpyrene skin carcinogenesis, mouse: 1733
PROSTATE NEOPLASMS
  induction, single-cell culture, methylcholanthrene, rat: 1771
PROTEINS
  effect of aflatoxins and nitrosamines, rat liver: 1742
  nitrosoguanidine derivative binding, cell-free systems: 1714
  serum, aflatoxin-poisoned ducklings: 1794
PSYCHOLOGICAL FACTORS
  personality patterns and neuroendocrine factors, human cancer, review: 1660
PYRROLIZIDINE ALKALOIDS (See also Lasiocarpine)
  mechanism of action, rat liver mitochondria: 1747

RADIATION
  chromosomal damage, human cancer: 1708
RADIATION CARCINOGENESIS
  effect of hormones, mouse, review: 1695
  human, review: 1254
  liver, ^{232}Th (Thorotrast), human: 1935
  lung, mathematical model: 1696
  mammary gland, effect of ethionine, rat: 1705
  ovary, effect of hormones, rat: 1756
  skin, mathematical model: 1696
    UV content of sunlight, Australia: 1703
    vascular pathology, mouse: 1711
RADIATION LEUKEMOGENESIS
  breast cancer: 1699,1700
  Hiroshima and Nagasaki: 1697,1698
  human, review: 1254
  thymoma, mouse: 1706,1707
  uterus cancer: 1699
  virus-like particles, hamster lymphoma: 1710
  X-rays or ^{90}Sr, mouse: 1704
RADIOACTIVE ISOTOPES
  ^{232}Th (Thorotrast), liver tumors, human: 1935

SALIVARY GLAND NEOPLASMS
  epidemiology, Iowa: 1939
SCAR TISSUE (See also under Injuries)
  burns, nuclear DNA, mouse skin: 1730
  dust particle uptake, rat lung: 1721
  foreign body, meningioma, adolescent: 1701
  larynx, and larynx cancer, human: 1712
  lung cancer: 1702
SELENIUM
  effect on DMBA- or methylcholanthrene-induced skin tumors, mouse: 1778
SEX
  chromatin, ovarian teratoma or trophoblastic tumors: 1988
  difference
    dimethylnitrosamine hepatoma, rat: 1790

EX (Contd.)
    Friend leukemia virus sensitivity, mouse: 1813
    hydroxyfluorenylacetamide metabolism, rat: 1764
  hormones
    effect on DMBA-induced mammary tumors, rat: 1780
    methylcholanthrene-induced cervix and uterus cancer, mouse: 1753
KIN
  chemical or thermal injury, nuclear DNA, mouse: 1730
  non-specific irritation, mechanism, mouse: 1734
KIN CARCINOGENESIS
  arsenic and chromium, occupational, nasal septum: 1729
  benz(a)acridine or benz(c)acridine derivatives, bioassay, mouse: 1732
  benzpyrene, effect of polyethylene extracts, mouse: 1733
  dimethylbenzanthracene, mouse: 1731,1735,1778
  methylcholanthrene, mouse: 1730,1734,1778
  paraffin + dimethylbenzanthracene, and inflammation, mouse: 1776
  radioactive particles, mathematical model: 1696
  sunlight, UV levels, Australia: 1703
  urethan, mechanism, mouse: 1736
  UV radiation, vascular pathology, mouse: 1711
KIN DISEASES
  lupus vulgaris, cancer incidence and isoniazid therapy: 1724
KIN NEOPLASMS
  benign, epidemiology, offspring of women with breast cancer: 1953
  Bowen's disease, virus-like particles: 1894
  epidemiology
    Poland: 1924
    UV levels in sunlight, Australia: 1703
  isoniazid-treated lupus vulgaris: 1724
PINAL CORD NEOPLASMS
  dysembryoplastic, epidemiology, Rumania (Bucharest): 1947
TILBENE, 4-DIMETHYLAMINO-
  ear duct tumors, growth kinetics, rat: 1965
TOMACH NEOPLASMS
  epidemiology
    environmental and socioeconomic factors: 1934
    Poland: 1924
    tumor risk and tumor histology, Mexico City and Colombia: 1933
  induction, methylcholanthrene, method, rat: 1750
  smoking and occupation, Japan: 1932
V40 (See under Virus, papova)

ERATOGENESIS
  cycasin aglycone, hamster: 1784
  ethylnitrosourea, rat: 1727
ESTIS NEOPLASMS
  epidemiology, South Africa (Cape Town), ethnic groups: 1952

THYROID DISEASES
  goiter, thyroid cancer, Madagascar: 1943
  propylthiouracil-induced hypothyroidism,
    effect on DMBA-induced mammary carcinogenesis, rat: 1779
THYROID NEOPLASMS
  epidemiology
    goiter region, Madagascar: 1943
    review: 1694
  virus-containing buffy coat cell line: 1806
TOBACCO
  occupational exposure, ear-nose-throat cancer, Hungary: 1937
  processing factories, upper respiratory cancer, Hungary: 1337
TOBACCO SMOKE
  acrolein, mutagenesis, algae: 1720
  nickel content, review: 1669
TOBACCO SMOKING
  biliary tract cancer, husband and wife: 1926
  bladder cancer, Japan: 1927,1932
  cancer risk, asbestos exposure, review: 1668
  ear-nose-throat cancer, Hungary: 1937
  familial larynx cancer: 1975
  larynx cancer, Japan: 1936
  liver tumors, Japan: 1935
  lung cancer, Italy (Rome): 1959
    Japan: 1932
  photochemical repair, oral mucosa: 1709
  stomach cancer, Japan: 1932
    and peptic ulcer: 1934
  upper respiratory tract cancer, Hungary: 1937
TOXICITY
  aflatoxins
    liver, rat: 1745
    serum proteins, duckling: 1794
    swine: 1740,1795
  cycasin aglycone, mouse or rat: 1793
  dimethylbenzanthracene, selective, rat tissues: 1773
  liver, carcinogenic or non-carcinogenic chemicals, mechanism, review: 1663
  methylcholanthrene, monkey: 1785
  petroleum distillates, lung, rat: 1722
  pyrrolizidine alkaloids, liver, mechanism, rat: 1747
TRYPTOPHAN
  cocarcinogenesis, bladder, dog: 1774
TURPENTINE
  skin irritation, mechanism, mouse: 1730,1734

URETER NEOPLASMS
  epidemiology, "Balkan nephritis" areas, Yugoslavia: 1951
URETHAN (See also under Carbamate derivatives)
  skin or liver tumors, mouse: 1736
UTERUS NEOPLASMS (See under Corpus uteri neoplasms)

VIRAL CARCINOGENESIS
  defective viruses, review: 1655
  DNA- and RNA-containing viruses, review: 1658

- VIRAL CARCINOGENESIS (Contd.)
  - effect of hormones, mouse, review: 1695
  - hamster cell lines: 1844
  - heteroploid cell lines, review: 1683,1684, 1685
  - nonhuman primates: 1921
  - primary tissue culture cells, review: 1682
  - review: 1670
  - vaccines from tumor-inducing cell lines, mouse or rat: 1868
  - veterinary vaccines, review: 1657
  - virus interactions, review: 1656,1690
  - viral vaccines, review: 1687,1688,1689
- VIRUS
  - arbovirus, Guaroa, interaction with mouse leukemia viruses: 1881,1883,1884
  - bovine tissues and cultures, review: 1678
  - canine tissues and cultures, review: 1679
  - cell cultures, marker chromosomes, review: 1675
  - DNA-containing, particles resembling, canine mast cell tumor: 1867
  - chick and duck tissues, review: 1676,1677
  - detection, methods: 1919
  - H-1, effect on adenovirus-12 *in vitro* or *in vivo*, hamster: 1846,1905
  - human and simian tissue cultures, review: 1681
  - latent, detection, review: 1686
  - Newcastle disease, effect on Rauscher leukemia virus, mouse cells: 1876
  - polio, Sabin vaccine, serum SV40 antibodies, adults and children, Italy: 1857
  - rabbit tissues and cultures, review: 1680
  - RNA-containing, particles resembling, methylcholanthrene-induced mouse brain tumor: 1872
  - wound tumor (plant), structure, comparison to reovirus: 1923
- VIRUS, ADENO-
  - antigens, human oropharynx cancer: 1842
  - CELO (chick embryo lethal orphan virus), tumor antigens: 1915
  - human, DNA composition: 1838
  - SA7 (simian), DNA composition: 1838
    - hamster tumors, morphology: 1845
  - SV40 hybrid, defective, review: 1655
  - type 7, SV40 hybrid (LLE46), surface antigens, transformed cells: 1864
  - type 12
    - effect of adeno-associated viruses, hamster: 1917
      - defective (H-1) and helper adenovirus, hamster cells: 1905
    - genetic susceptibility to transformation, human fibroblast lines: 1840
    - hamster tumors, effect of H-1 virus: 1846
      - isolation of tumor antigens: 1843
    - mutagenesis (chromosome breaks), normal cells: 1841
    - mutants, properties: 1839
    - skin graft survival, tumor-bearing hamster: 1904
    - specific antigens infected or hamster tumor cells: 1858
    - ultrastructure, transformed or infected animal or human cells: 1903
- VIRUS, HERPES-TYPE
  - Burkitt lymphoma (EB virus; human)
    - comparison to reovirus: 1809
    - detection, cell lines, method: 1914
    - transformation, fetal WBC: 1798
  - herpes simplex, infection, with lymphoma, complication of immunosuppression, human: 1800
  - human leukemia or infectious mononucleosis: 1912
  - Lucké (frog) kidney tumor, morphology: 1866
  - Marek's disease (avian): 1913
- VIRUS, LEUKEMIA/LYMPHOMA
  - avian
    - intracytoplasmic structures, review: 1674
    - leukosis, possible vaccine transmission, review: 1657
    - myeloblastosis, protein components: 1831
  - BAI strain A (avian myeloblastosis), classification: 1820
  - cat, comparison to mouse (Gross) or avian (Rous) viruses: 1815
  - Friend (mouse)
    - comparison to S63 and GC mouse lymphoma viruses: 1808
    - effect of arbovirus (Guaroa), mouse: 1881
      - interferon-inducing agent (Statolon), mouse: 1878
    - infected cells, tumor induction: 1875
      - ultrastructure: 1814
    - NTF reticulum cell sarcoma: 1811,1812
    - interaction with Moloney sarcoma virus, cell culture: 1823
      - Rauscher leukemia virus: 1881
    - sex difference in sensitivity: 1813
    - spleen focus-forming component, separation and bioassay: 1879,1880
    - splenic RNA: 1877
  - Gross (mouse)
    - comparison to cat leukemia virus: 1815
    - host immunity, review: 1673
    - infected mouse cell line, tumor induction: 1875
    - propagation in kidney: 1816
  - human
    - "Australia antigen," review: 1671
    - familial Chediak-Higashi anomaly: 1801
    - Hand-Schüller-Christian disease, child: 1799
    - morphology: 1802
    - serum hemagglutinins: 1803
    - WBC from thyroid cancer case: 1806
  - MC29 (avian leukosis), classification: 1819
  - Moloney (mouse)
    - comparison to S63 and GC mouse lymphoma viruses: 1808
    - host immunity: 1822
    - infected mouse cell line, tumor induction: 1875
  - mouse, cat and human, comparison: 1874
    - myeloma, Type A particles: 1873
    - plasma cell leukemia, amyloidosis-inducing agent: 1672

- *Mycoplasma*, human leukemia: 1804
- PS (mouse), mammary tumor induction: 1834

- VIRUS, LEUKEMIA/LYMPHOMA (Contd.)
  - RadLV (radiation leukemia virus; mouse), rescue of defective Moloney sarcoma virus, mouse: 1889
  - Rauscher (mouse)
    - antigen titration method: 1810
    - attenuation of tumor-inducing cell line: 1817
    - chemotherapy: 1918
    - comparison to S63 and GC mouse lymphoma viruses: 1808
    - effect on hyaluronic acid *in vitro*: 1818
      - serum copper: 1882
    - infected mouse cell line, tumor induction: 1875
    - interaction with Friend leukemia virus: 1881
      - Newcastle disease virus, mouse cells: 1876
  - S63 and GC lymphoma (mouse), comparison to mouse leukemia viruses: 1808
  - thymoma, ultrastructure, mouse: 1706
  - transmission, CFW_W mouse: 1893
    - hybrid mouse strains: 1892
  - Type A particles, radiation-induced lymphoma, hamster: 1710
- VIRUS, MAMMARY TUMOR
  - mouse
    - attachment and penetration, mouse embryo cells: 1901
    - bioassay, method: 1896,1900
    - effect of hormones from pituitary graft on tumor development: 1902
    - genetic susceptibility: 1837
    - immunoassay, method: 1899
    - physical properties: 1897,1898
    - RNA structure: 1836
    - propagation, mixed tumors: 1835
  - particles resembling, human Bowen's disease (skin): 1894
    - breast tumors: 1805,1895
  - PS (mouse), from PS leukemia: 1834
  - transmission, CFW_W mouse: 1893
    - hybrid mouse strains: 1892
- VIRUS, PAPOVA (papilloma-polyoma-vacuolating)
  - particles resembling, human Wilms' tumor: 1906
  - polyoma
    - DNA properties: 1849,1853,1916
    - hamster tumors, viral and tumor mitochondrial DNA: 1848
    - high titer, method of preparation: 1851
    - isolation, transformed or tumor cells: 1855
    - morphology of particles: 1847
    - propagation, mouse salivary gland explants: 1854
    - transformed bovine cells, growth in mixed culture: 1852
    - tumor stimulation by adjuvant, mouse: 1827
    - viral and cellular DNA synthesis: 1850
  - specific antigens, infected cells: 1858
    - surface antigens, transformed cells: 1864
  - SV40
    - actinomycin effect on DNA: 1861
    - effect on cellular RNA: 1860

- VIRUS, PAPOVA (papilloma-polyoma-vacuolating) (Contd.)
    - genetic susceptibility, human fibroblast lines: 1840
    - hamster tumors, viral and tumor mitochondrial DNA: 1848
      - karyotype: 1859
    - isolation, transformed or tumor cells: 1855
    - mutant, monkey kidney cells: 1909
      - transformation, mouse or human cells: 1907
    - "rescued", transformation, mouse or human cells: 1907
    - resistance, SV40-transformed monkey and human cells: 1908
    - serum antibodies, African or Asiatic monkeys: 1856
      - polio vaccination, adults and children, Italy: 1857
    - specific repressor, transformed cells: 1863
  - surface antigens, transformed cells: 1864
    - transcription, transformed cells: 1862
    - transformation, hamster cell lines: 1844
      - human cell strains: 1911,1922
    - transplantation immunity, monkey or hamster cell lines: 1910
  - SV40-adenovirus hybrid, defective, review: 1655
  - SV40-adenovirus 7 hybrid (LLE46), surface antigens, transformed cells: 1864
- VIRUS, POX
  - Shope fibroma (rabbit), thymidine kinase, infected human cells: 1865
- VIRUS, SARCOMA
  - avian, intracytoplasmic structures, review: 1674
  - chicken, tumor development, hormone-treated monkey: 1871
  - FBJ osteosarcoma (mouse), classification: 1886
  - Fujinami (avian), transformed cells, growth patterns *in vitro*: 1833
  - Harvey (mouse)
    - tumor pathology: 1887
      - mouse, rat or hamster: 1826,1888
  - Kirsten (mouse), tumor-specific transplantation antigens: 1885
  - Moloney (mouse)
    - biological and physical properties: 1824,1890,1891
    - defective, properties: 1891
      - properties, review: 1655
      - rescue, radiation leukemia virus: 1889
    - effect of interferon *in vitro*: 1825
    - host immunity: 1822
    - rescue, radiation leukemia virus: *in vivo*: 1889
    - serum copper: 1882
    - transformation, mechanism, cell culture: 1823
    - tumor induction, effect of Guaroa arbovirus, mouse: 1883,1884
      - pathology, mouse, rat or hamster: 1887, 1888
  - mouse, effect of cation, mouse embryo cells: 1821
  - Rous (chicken)
    - brain tumors, puppy: 1869

VIRUS, SARCOMA (Contd.)
    comparison to cat leukemia virus: 1815
    defective, properties, review: 1655
    human glioma cultures: 1807
    interference phenomenon *in vitro*: 1828
    maturation time, normal cells: 1830
    mechanism of action, chick embryo cells: 1829
    mutagenesis (chromosome breaks), human WBC: 1841
    propagation method: 1832
    protein components: 1831
    strain RSV-RAV1, natural immunity, chicks: 1870
    strain RSV-RAV50, surface antigens, transformed cells: 1864
    transformation, mechanism, cell culture: 1823
    transformed cells, growth patterns: 1833, 1852
VIRUS, SARCOMA (Contd.)
    tumor induction, marmoset: 1920
    tumor stimulation by adjuvant, rat: 1827
VITAMIN E
    effect on methylcholanthrene or DMBA skin tumors, mouse: 1778

WATER
    saline, benzpyrene content and plankton types: 1715
WATER POLLUTION
    "Balkan nephritis" syndrome and urothelial tumors, Yugoslavia: 1951

XANTRENIC ACID 8-METHYL ETHER
    metabolism, mouse: 1766

Erratum: In Volume VII, Issue 3 correct the last 2 sentences of abstract #626 to read: Through age 19 yr., approx. 50% of all reported tumors involved the lymphatic tissues and/or the hematopoietic system. In age 20 and over, the prevalence of g.i. cancer increased markedly, affecting both sexes to an essentially equal degree (no other details).

U.S. DEPARTMENT OF
HEALTH, EDUCATION; AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

THE LIBRARY OF THE
OCT 2 1969
UNIVERSITY OF ILLINOIS

DQ

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

Vet. Med.

EPTEMBER 1969
Abstract Nos. 1989-2198

Vol. 7
No. 9

OCT 20 69

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

CARCINOGENESIS ABSTRACTS

Volume 7, Number 9
September, 1969

(Submitted for Publication
June, 1969)

Abstracts Numbers
1989-2198

CONTENTS

	Page
Review	385
Physical Carcinogenesis	387
Chemical Carcinogenesis	390
Viral Carcinogenesis	400
Epidemiology and Biometry	409
Miscellaneous	422
Author Index	i
Subject Index	iv

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a na- ional program of cooperative research in cancer, is establishing a means whereby information n the field of carcinogenesis will be coordinated and made available. The information to be ncluded will be obtained from the National Cancer Institute, other governmental agencies, and on-governmental research institutions.

The issuing of Carcinogenesis Abstracts under the auspices of the National Cancer Insti- ute will provide a central source for current abstracting of the carcinogenesis literature be- ng published throughout the world. This will help facilitate an integrated and cooperative rogram of investigation in this area. The growing number of publications in the area of car- inogenesis makes imperative the availability of an appropriate abstracting service so that in- estigators may be apprised of progress with a minimum of delay. It is our desire to provide he investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most ecently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by Index Medicus f the journal is not covered by Index Medicus, then the abbreviations (with some modifications) ound in World Medical Periodicals, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

dmin.	administered, administration	mg	milligram(s)
v.	average	min.	minute(s)
	curie(s)	ml	milliliter(s)
C	millicurie(s)	mm	millimeter(s)
C	microcurie(s)	mo.	month(s)
m	centimeter(s)	MTD	maximum tolerated dose
onc.	concentration	NIH	National Institutes of Health, USA
pm	counts per minute	p.o.	orally
NA	deoxyribonucleic acid	QO_2	oxygen quotient
Nase	deoxyribonuclease	PFU	plaque forming unit
.g.	for example	ppm	parts per million
FU	focus forming unit	pt.(s)	patient(s)
.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
	gram(s)	RES	reticuloendothelial system
g	microgram(s)	resp.	respectively
b	hemoglobin	RNA	ribonucleic acid
.a.	intra-arterial	RNase	ribonuclease
D_{50}	median infectious dose	soln.	solution
nj.	injected, injection(s)	s.c.	subcutaneous
noc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
.p.	intraperitoneal	x	times (e.g. x 3/wk.)
.U.	international unit(s)	U	unit
.v.	intravenous	UV	ultraviolet
g	kilogram(s)	vol.	volume
D_{50}	median lethal dose	VA	Veterans Administration
	molar, mole(s)	wt.	weight
M	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
M	micromole(s)		
ax.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

f.	Afrikaans	E.	English	Hun.	Hungarian	Lith	Lithuanian	Ser.	Serbo-Croatian
r.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
ul.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
h.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
z.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
an.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
ut.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

69-1989 THE POSSIBLE CARCINOGENIC ACTION OF ALKALOIDS OF TOBACCO AND BETEL NUT. (E.) Boyland, E. (Chester Beatty Res. Inst., London). Planta Med. Supp. to 1968: 13-23, 1968. (32 references)

Experimental evidence is presented to suggest that the principal alkaloids of tobacco (nicotine and its major metabolite, cotinine) and betel nut (arecoline, arecaidine, arecolidine and guvacine) are slow carcinogens in mice and rats. In a discussion of the metabolic pathways of these alkaloids, it is suggested that the cyclic lactam or N-oxide metabolites of nicotine, and the mercapturic metabolites of arecoline and arecaidine, may be the actual carcinogens.

69-1990 ROLE OF THE METHYLATED NUCLEIC ACIDS IN CARCINOGENESIS. (E.) Datta, R. K. (Beth Israel Med. Ctr., New York, N. Y.) and B. Datta. Exp. Molec. Path. 10(2):129-140, 1969. (76 references)

Cells of spontaneous or induced animal and human tumors (including tumor cell lines) show higher levels of DNA and RNA methylation than the corresponding normal cells. Several hypothetical mechanisms of carcinogenesis involving nucleic acid methylation are discussed.

69-1991 IDENTIFICATION OF ESTABLISHED CELL LINES WITH REFERENCE TO KARYOLOGY. (E.) Moorhead, P. S. (Wistar Inst. Anat. Biol., Philadelphia, Pa.). Nat. Cancer Inst. Monogr. 29:45-50, 1968. (23 references)

Spontaneous and external factors (including viruses, radiation, chemicals and serum factors) affecting the chromosomal stability of a cell line are discussed.

69-1992 DETECTION OF VIRAL LATENCY BY BIOCHEMICAL METHODS. (E.) Green, M. (St. Louis U. Sch. Med., Mo.). Nat. Cancer Inst. Monogr. 29:375-389, 1968. (34 references)

Biochemical methods can be used to detect viral latency at any step of viral replication (DNA viruses) and to detect the parental viral genome (RNA viruses). It is possible to determine biochemically whether a cell is latently infected by any known virus which can be easily grown and purified; pure viral nucleic acids are necessary reagents in homology tests. These methods have been successful in DNA virus-infected or transformed cells, while there is little data on RNA virus-infected cells.

69-1993 DETECTION OF VIRAL LATENCY BY BIOCHEMICAL METHODS - DISCUSSION. (E.) Axelrod, D. (NIH, Bethesda, Md.). Nat. Cancer Inst. Monogr. 29:391-392, 1968. (No references)

The importance of the purification of a specific tumor virus for hybridization studies is emphasized. Large numbers of determinations are needed to achieve significant quantitative relationships between the virus and the cell or among specific viruses (using direct binding of either RNA or DNA to DNA). Competition experiments are suggested, since it is possible to evaluate 2 nucleic acid samples in 1 study. Fragmentation of host cell DNA, followed by fractionation on hydroxyapatite columns or by CsCl gradient centrifugations, allows the selection of specific areas of base composition for examination, and can enhance the detection of DNAs differing from most host cell DNA.

69-1994 METHODS FOR DETERMINING NEOPLASTIC PROPERTIES. (E.) Foley, G. E. (Harvard Sch. Med., Boston, Mass.). Nat. Cancer Inst. Monogr. 29:217-228, 1968. (60 references)

Cell cultures used to prepare human viral vaccines may or may not have neoplastic properties; after a discussion of available evidence, it is concluded that none of the methods presently used to characterize neoplastic properties can define the attributes pertaining only to neoplastic (or non-neoplastic) cell lines. It is recommended that purified vaccines, freed of extraneous products derived from the cell cultures in which they were produced, should be developed.

69-1995 METHODS FOR DETERMINING NEOPLASTIC PROPERTIES - DISCUSSION. (E.) Dawe, C. J. (NCI, Bethesda, Md.). Nat. Cancer Inst. Monogr. 29:229-232, 1968. (11 references)

A new approach to the identification of cell lines with neoplastic properties is discussed, involving the isolation of phenotypic traits of cells in vitro that will serve as indicators of their oncogenicity under more or less particular conditions in vivo. It is pointed out that cell cultures can lose (as well as gain) oncogenic capabilities after prolonged maintenance in continuous culture.

69-1996 METHODS FOR DETERMINING NEOPLASTIC PROPERTIES - DISCUSSION. (E.) Sandberg, A. A. (Roswell Park Mem. Inst., Buffalo, N. Y.). Nat. Cancer Inst. Monogr. 29:233-239, 1968. (5 references)

Non-neoplastic development of chromosomal abnormalities, aneuploidy as compared to diploidy in human and animal neoplastic cells, and the neoplastic state as an abnormal function of chromosomal DNA, are discussed. More sensitive and reliable systems to determine the neoplastic characteristics of cell lines are recommended.

69-1997 THE EPIDEMIOLOGY OF BREAST CANCER. (E.) Zippin, C. (U. California Sch. Med., San Francisco). Oncology 23(2):93-98, 1969. (7 references)

Criteria that may be used to separate a total population of women into groups with a low or high risk of breast cancer are discussed.

69-1998 THE ODONTOGENIC CYST AS A POTENTIAL CARCINOMA: A CLINICOPATHOLOGIC APPRAISAL. (E.) Gardner, A. F. (9039 Sligo Creek Pkwy., Silver Spring, Md.). J. Amer. Dent. Ass. 78(4):746-755, 1969. (58 references)

A literature survey (1889-1967, inclusive) disclosed more than 81 doubtful cases and 25 pathologically confirmed cases of carcinoma arising from odontogenic cysts. In the 25 pts. (17 men, 8 women) with confirmed tumors of this type, 15 tumors developed in the mandible, 9 in the maxilla and 1 in an unknown site. All of these 25 tumors were squamous cell carcinomas arising from the epithelial linings of the odontogenic cysts (radicular, residual or follicular); no carcinomas arising from cystic ameloblastomas were found. Chronic inflammation of long-standing odontogenic cysts was confirmed pathologically and clinically in 25/25. The true incidence of carcinoma arising in an odontogenic cyst is unknown but probably small (estimated at 1/million in 1 report).

69-1999 Chemical Induction of Cancer: Structural Bases and Biological Mechanisms, Vol. I. Arcos, J. C., M. F. Argus and G. Wolf. New York, Academic Press, 1968, 491 pp. (494 references)

This first volume of a 3-volume series comprises a discussion of the physical (molecular) bases for the action of chemical carcinogens (pp. 17-299) and a section on the nature of chemically-induced tumors and methods for the testing of chemical carcinogens (pp. 303-463).

69-2000 OCCURRENCE, DISTRIBUTION AND CHARACTERISTICS OF CARCINOGENS CONTAINED IN MOLD FUNGI. (Ger.) Frank, H. K. (Fed. Res. Inst. Food Preserv., Karlsruhe, Germany). Planta Med. Supp. to 1968:64-76, 1968. (65 references)

The natural sources, chemical composition and carcinogenic properties of the aflatoxins, sterigmatocystine, luteoskyrin, patulin, skyrin and regulosin are discussed. The need for better inspection procedures to guard against their occurrence in both human and animal foodstuffs and other materials is emphasized.

69-2001 RECENT STUDIES OF THE MOUSE LEUKEMIA VIRUSES. (Ger.) Bierwolf, D., F. Fey, A. Graffi, C. Pasternak and T. Schramm. Ergebn. Mikrobiol. Immunitaetsforsch. 46:26-95, 1968. (349 references)

The properties and mechanisms of action of the mouse leukemia viruses are extensively discussed, with particular reference to the Gross, Moloney, Rich, Friend, Stansly, Rauscher and Graffi viruses.

69-2002 RISK OF CANCER OF THE GASTRIC STUMP. (Ger.) Hilbe, G. (U. Surg. Clin., Innsbrück, Austria), G. M. Salzer, H. Hussl and H. Kutschera. Langenbecks Arch. Klin. Chir. 323(2):142-153, 1968.

Autopsy records for 1945-1964 revealed stomach cancer in 533/9857 pts. (5.4%) who had not undergone surgery of the stomach. The records for 412 pts. who had undergone partial gastrectomy (at least 5 yr. prior to autopsy) disclosed 33 certain and 8 possible cases of cancer of the gastric stump (8.2% with confirmed cancer; 10% with confirmed or possible cancer), a significantly higher frequency than in the larger pt. group. In pts. with benign diseases of the stomach, the risk of stomach cancer development was estimated at 5-6%, compared to 8-10% in pts. undergoing gastrectomy. The possible role of gastritis (including gastritis of the gastric stump) as a contributory factor is discussed. In view of the complications that may arise if gastrectomy is not performed, such as the risk of malignant transformation of a gastric ulcer (estimated at about 5%), it is concluded that partial gastrectomy is still justifiable in certain cases. The follow-up time was still too brief (at the time of report) to determine the frequency of stomach cancer in pts. undergoing newer forms of surgery, such as vagotomy with drainage.

69-2003 CONTACT SPREAD OF CARCINOMA OF THE SKIN. (E.) Fagan, P. A. (St. Vincent's Hosp., Sydney, Australia). Aust. New Zeal. J. Surg. 38(3):272-277, 1969.

Basal cell carcinomas of identical histology were found on the left external ear and left thumb of a 62-yr.-old man. The tumor of the thumb developed on an unhealed burn scar of 17 mo. duration (the same thumb had also been injured 20 yr. previously, leaving a slowly-healing wound); the carcinoma of the ear was of 14 mo. duration. The pt. habitually slept on his left side, with the thumb in contact with the ear. Evidence for and against the possibility that the tumor of the ear was an implantation or contact metastasis is discussed.

69-2004 CARCINOMA AND SARCOMA IN A VARICOSE ULCER CAUSED BY A WAR INJURY. (Ger.) Schulz, H. (U. Düsseldorf, Germany) and W. Schüller. Chirurg 40(3):138-142, 1969.

A "collision tumor" was found at the site of an unhealed varicose ulcer of 33 yr. duration in a 70-yr.-old man. The pt. had been wounded at the site where the ulcer later developed (the right lower leg), 48 yr. previously. The tumor consisted of a polymorphocellular fibrosarcoma of the tibial periosteum, extending up through the ulcer and mixed in some places with a multilocular squamous cell carcinoma, which had developed on the margin of the ulcer. A literature survey disclosed only 2 similar cases of collision tumors superimposed on chronic leg ulcers.

69-2005 PRIMARY EXTRASKELETAL CHONDROSARCOMA. REPORT OF A CASE ARISING IN CONJUNCTION WITH EXTRAPLEURAL LUCITE BALL PLOMBAGE. (E.) Thompson, J. R. (City Chicago Mun. Tuberc. Sanit., Ill.) and S. D. Entin. Cancer 23(4): 936-939, 1969.

Extraskeletal chondrosarcoma of the lung (without metastases) was found at autopsy in a 60-yr.-old Caucasian woman, who had undergone right extrapleural plombage (using lucite spheres) for pulmonary tuberculosis 18 yr. previously. The tumor was intimately associated with the fibrous capsule surrounding the lucite (polymethylmethacrylate) spheres. It was postulated that the plastic may have acted as a carcinogen, with the tissue reaction initiated by these foreign bodies providing the conditions required for neoplastic change.

69-2006 OUR OBSERVATIONS ON SCAR CANCER OF THE LUNG. (Ger.) Bajtai, A. (U. Budapest, Hungary), E. Pintér, I. Besznyák and J. Juhász. Prax. Pneumol. 23(2):118-129, 1969.

Over a 10-yr. period (1957-1967), the authors observed 344 cases of primary lung cancer, 74 of which (21.5%) were scar cancer (39/100 surgical specimens, 35/244 autopsy specimens). All of the scar cancers were peripheral (accounting for 43.7% of the 164 peripheral lung cancers observed). The age and sex distribution in the pts. with scar cancer was about the same as in the 270 cancer pts. without pulmonary scars. Most of the scar cancers were superimposed on lesions of tuberculosis.

69-2007 MALIGNANT MELANOMA. A REVIEW OF 10 YEARS' EXPERIENCE IN GLASGOW, SCOTLAND. (E.) Cochran, A. J. (West. Infirm., Glasgow, Scotland). Cancer 23(5):1190-1199, 1969.

In 1952-1961 (inclusive), 165 adults with extraocular malignant melanoma were seen at this hospital. The majority of tumors developed on the head and neck (31%) or legs (31%; 55% of these developed below the knee). The melanoma mortality rates in pts. with tumors developing on sunlight-exposed areas (76/165 pts.) and pts. with tumors on clothing-covered areas (61/165) were significantly different; the 5-yr. survival rates were 58% and 35%, resp. (36% and 9%, resp., in males; 68% and 51%, resp., in females). Antecedent pigmented lesions at the primary tumor sites were reported by 74/151 pts., but the presence or absence of such pigmented lesions apparently did not affect the prognosis (except for the frequency of local recurrences).

69-2008 PHOTODERMATOSIS PRECEDING MYCOSIS FUNGOIDES. (E.) Gould, W. M. and D. S. Waldorf. JAMA 208(6):1029, 1969.

A 42-yr.-old Negro man developed severe photodermatosis, which became incapacitating within a short time (the pt. could tolerate no sunlight at all). Mycosis fungoides was diagnosed about 1 yr. after the onset of photodermatosis; a course of electron-beam radiotherapy caused regression of the skin lesions, but had no effect on the photosensitivity, and caused no unusual reactions.

69-2009 RADIATION INDUCED NEOPLASIA FOLLOWING EXTERNAL BEAM THERAPY FOR CHILDREN WITH RETINOBLASTOMA. (E.) Sagerman, R. H. (Columbia-Presbyterian Med. Ctr., New York, N. Y.), J. R. Cassady, P. Tretter and R. M. Ellsworth. Amer. J. Roentgen. 105(3):529-535, 1969.

From 1930-1963 (inclusive), 625 children with retinoblastoma were registered at this center; 397 received radiotherapy (RT), and 243/397 were followed up for 5 yr. or more. Second primary tumors developed in 23/243; excluding 2 pts. with osteosarcoma of the femur, the 21 presumably radiation-induced tumors included 9 osteosarcomas, 2 cases each of fibrosarcoma, unspecified sarcoma, papillary-follicular carcinoma of the thyroid, and squamous cell carcinoma (skin or lacrimal sac), and 1 case each of rhabdomyosarcoma, basal cell carcinoma (skin), malignant mesenchymoma, and malignant fibrous histiocytoma. Excluding 9/243 in whom the RT dosage was unknown, and the 2 pts. with thyroid cancer (treated with radium brachytherapy), the incidence of radiation-induced tumors in the 232 pts. at risk showed a quadratic relationship to the RT dosage: 12/38 (32%) at 11,000-15,000 r; 4/73 (5.5%) at 6000-10,999 r; and 3/121 (2.5%) at less than 6000 r. The mean latent period (from the end of RT to the onset of the second tumor) was 11 yr. (range, 4-30 yr.; 5 second tumors developed 5 yr. after RT was completed). No direct correlation between the latent period and the RT dose was found. Modified life-table analysis showed a significant reduction in the risk of radiation-induced tumors with the RT doses presently used (tumor doses of 3500-4500 r), compared to the risk associated with the high-dose regimens used from 1930-1945 (tumor doses of about 11,000-14,000 r).

69-2010 ANAPLASTIC THYROID CANCER TWELVE YEARS AFTER RADIOIODINE THERAPY. (E.) Baker, H. W. (2250 N. W. Flanders St., Portland, Ore.). Cancer 23(4):885-890, 1969.

Anaplastic carcinoma of the thyroid was found in a 64-yr.-old woman, who had received 2 therapeutic doses of ^{131}I (total, 16 mC) and 1 tracer dose (154 μC) for hyperthyroidism 12 yr. previously. A literature survey disclosed a small number of similar cases in adults, although the incidence may be within the range of statistical coincidence. The risk of thyroid cancer following irradiation of the neck is apparently smaller in adults than in children, and the latent period is longer.

69-2011 EXPERIMENTAL CARCINOGENESIS. BRONCHIAL INTRAMURAL ADENOCARCINOMAS IN RATS FROM X-RAY IRRADIATION OF THE CHEST. (E.) Gross, P. (U. Cincinnati, Ohio), E. A. Pfitzer, J. Watson, R. T. P. DeTreville, M. Kaschak, E. B. Tolker and M. A. Babyak. Cancer 23(5):1046-1060, 1969.

Lung carcinogenesis by X-irradiation of the chest (total dose, 3000 or 4000 r) was studied in 203 rats and 208 hamsters (9 and 14 wk. old, resp., at the time of irradiation). Some animals also received intratracheal inj. of 9,10-dimethylbenzanthracene (DMBA; 100 or 400 μg/dose; 4 or 16 doses at 4- or 1-wk. intervals, resp.), beginning an av. of 8 wk. after irradiation. The lung tumor prevalence in rats surviving 9 mo. (the first lung tumor appeared after 9.5 mo.) and hamsters surviving 2.5 mo. was 80/186 (43%) and 6/237 (3%), resp. DMBA did not enhance the tumor-inducing capacity of the irradiation in either species. DMBA alone (without irradiation) induced lung tumors in 6% of the hamsters, but did not induce lung tumors in rats. Mortality rates in animals treated with X-rays + DMBA were higher than the sum of the mortality rates in animals treated with either X-rays or DMBA alone. In the irradiated rats, 88% of the tumors were adenocarcinomas and 86% affected the bronchi; many of the tumors were intramural and seemed to develop from aberrant intramural glands.

69-2012 COMPARATIVE EFFECTS OF PURIFIED DIETS AND A NATURAL FOOD STOCK RATION ON THE TUMOR INCIDENCE OF MICE EXPOSED TO MULTIPLE SUBLETHAL DOSES OF TOTAL-BODY X-IRRADIATION. (E.) Ershoff, B. H. (U. Southern California Sch. Dent., Los Angeles), G. S. Bajwa, J. B. Field and L. A. Bavetta. Cancer Res. 29(4):780-788, 1969.

Female Swiss-Webster mice, fed with a stock diet (Purina laboratory chow) or 6 different purified diets for 28 days, were exposed to sublethal doses of total-body X-irradiation (1200 r over 6 wk.). The frequency of grossly visible tumors was studied 6 mo. after the beginning of irradiation. The 210 non-irradiated controls on these 7 experimental diets showed 2 mammary tumors and 3 tumors of the thymus. In irradiated mice fed the stock diet, the frequencies of tumors of the mandibular lymph nodes (lymphosarcomas), thymus (lymphosarcomas), uterus (adenocarcinomas) or Harderian glands (adenocarcinomas) were 20.5%, 12.8%, 0.0% and 8.3%, resp. These tumors were much more frequent in mice fed the purified diets. The frequencies of these tumors varied according to the composition of the purified diets. The protective factor(s) present in the natural food stock ration seemed to be distinct from any of the known nutrients.

69-2013 THE MORPHOLOGY AND GROWTH CHARACTERISTICS OF RADIATION-INDUCED EPITHELIAL SKIN TUMORS IN THE RAT. (E.) Albert, R. E. (New York U. Med. Ctr., N. Y.), M. E. Phillips, P. Bennett, F. Burns and R. Heimbach. Cancer Res. 29(3):658-668, 1969.

The characteristics of 740 undifferentiated, sebaceous or keratinized skin tumors, induced in albino rats by graded doses of β-irradiation from ^{91}Y, are discussed. The times of onset (peak rates were seen about 20, 40 and 60 wk. after irradiation), frequency distributions and growth rates of these tumors were related to the degree of residual skin damage present. The structure of the skin tumors was explained by their origin from atrophic follicles.

69-2014 CELL POPULATION KINETICS IN RADIATION-INDUCED HYPERPLASTIC EPIDERMIS OF GUINEA-PIG SKIN. (E.) Chang Won Song (Albert Einstein Med. Ctr., Philadelphia, Pa.) and J. Tabachnick. Int. J. Radiat. Biol. 15(2): 171-174, 1969.

Cell proliferation was studied (by ^{3}H-thymidine incorporation into DNA) in the skin of male albino guinea pigs with radiation-induced epidermal hyperplasia. In irradiated skin, the epidermis and spinous layers consisted of more cell layers than the control skin, with a 2-3-fold increase in the basal cell population of the epidermis. The duration of DNA synthesis in irradiated and control skin was about the same, but the turnover time was significantly longer in irradiated skin (turnover times 50 and 150 days after irradiation were almost the same) than in normal skin. The existence in the regenerated acanthotic epidermis of a feedback mechanism, which suppresses the proliferative activity to compensate for the overgrown cell population (resulting in a new steady state of cell turnover at a new population level) is postulated.

69-2015 ORAL LESIONS CAUSED BY ILL-FITTING DENTURES. (E.) Bodine, R. L. (U. Puerto Rico Sch. Dent., San Juan). J. Prosth. Dent. 21(6):580-588, 1969.

69-2016 GIANT BASAL CELL EPITHELIOMA DEVELOPING IN ACUTE BURN SITE. (E.) Gaughan, L. J. (U. Texas Med. Branch, Galveston), J. R. Bergeron and J. F. Mullins. Arch. Derm. (Chicago) 99(5):594-595, 1969.

69-2017 MALIGNANT MELANOMA DEVELOPING IN A TATTOO. (E.) Kirsch, N. (56 Garden St., Hartford, Conn.). Arch. Derm. (Chicago) 99(5):596-598, 1969.

69-2018 A CASE OF NEUROFIBROMATOSIS COMPLICATED BY MEDULLOBLASTOMA, NEUROGENIC SARCOMA, AND RADIATION-INDUCED CARCINOMA OF THYROID. (E.) Corkill, A. G. L. (Govt. Hosp., Tripoli, Libya) and C. F. Ross. J. Neurol. Neurosurg. Psychiat. 32(1):43-47, 1969.

See also abstract nos.: 2169,2173

69-2019 GOBLET CELL INCREASE IN RAT BRONCHIAL EPITHELIUM AFTER EXPOSURE TO CIGARETTE AND CIGAR TOBACCO SMOKE. (E.) Lamb, D. (Inst. Dis. Chest, London) and L. Reid. Brit. Med. J. 1(5635):33-35, 1969.

In male rats, exposed for 6 wk. to either cigarette or cigar smoke (doses equivalent to 5-20 cigarettes/day, 5 days/wk.), both cigar and cigarette smoke caused a similar increase in the number of goblet cells in the trachea and intrapulmonary airways. This increase in goblet cells was proportional to the dose and was greatest in the proximal intrapulmonary airways. The cilia were not affected by the smoke, and none of the rats showed bronchiectasis, lymphocytic cuffing of the bronchi, or signs of transitional or squamous metaplasia.

69-2020 CYTOLOGIC AND CYTOCHEMICAL EFFECTS ON PRIMARY MOUSE KIDNEY TISSUE AND LUNG ORGAN CULTURES AFTER EXPOSURE TO WHOLE, FRESH SMOKE AND ITS GAS PHASE FROM UNFILTERED, CHARCOAL-FILTERED, AND CIGAR TOBACCO CIGARETTES. (E.) Leuchtenberger, C. (Swiss Inst. Exp. Cancer Res., Lausanne, Switzerland) and R. Leuchtenberger. Cancer Res. 29(4):862-872, 1969.

In primary monolayer cultures of Snell's mouse kidney and organ cultures of 17-day-old embryonic mouse lung, the cytological and cytochemical effects of whole, fresh smoke (WFS) and its gas phase (GP) from 3 types of cigarettes (unfiltered, same type but with an activated charcoal filter, and those made of cigar tobacco) were investigated using a smoking machine. No significant differences between the effects of WFS and GP were noted, but preparations from the 3 types of cigarettes had greatly different effects. Smoke puffs from unfiltered cigarettes caused rapid destruction of mouse kidney and lung cultures, whereas the only change seen in cultures exposed to smoke from filtered cigarettes was a temporary increase in the mitotic index (compared to control cultures). Smoke from cigarettes made from cigar tobacco caused less cellular damage than smoke from the unfiltered cigarettes; the nature of the damage caused by the cigar-tobacco smoke was somewhat different from the damage caused by cigarette-tobacco smoke.

69-2021 TAR AND NICOTINE RETRIEVAL FROM CIGARETTES AVAILABLE IN CANADA. (E.) Forbes, W. F., J. C. Robinson (U. Waterloo, Canada) and M. Stanton. Cancer 23(4):910-912, 1969.

The yields of tar and nicotine were determined for 85 brands of cigarettes available in Canada (some are also available in the U.S.). The cigarettes were obtained from the 5 geographical regions of Canada, but showed no significant variation in tar and nicotine values attributable to region. The tar or nicotine contents varied widely between brands of similar type and size. The tar content of unfiltered king-size cigarettes ranged from 27.6-36.0 mg/cigarette; for filtered king-size cigarettes, the tar contents were 7.9-26.4 mg/cigarette. "Premium-length" cigarettes (85-100 mm long; only 6 brands were tested) had higher tar contents than the king-size types. Nicotine contents also varied according to the size of the cigarettes and the presence or absence of filters.

69-2022 LARGE-SCALE FRACTIONATION OF CIGARETTE SMOKE CONDENSATE FOR CHEMICAL AND BIOLOGIC INVESTIGATIONS. (E.) Swain, A. P. (U.S. Dept. Agric., 600 E. Mermaid Lane, Philadelphia, Pa.), J. E. Cooper and R. L. Stedman. Cancer Res. 29(3):579-583, 1969.

Details of cigarette smoke condensate (CSC) fractionation and variability in yield of repetitive runs of 1000 g of CSC over a 12-mo. period are described. After separating the CSC into basic, acidic and neutral fractions, 12 subfractions were obtained by further fractionation for carcinogenicity testing. By pooling parts of each fraction, a reconstituted sample of CSC was prepared. The most significant differences in yield were observed with fractions obtained in amounts smaller than 40 g. The greatest source of variability was the removal and recovery of insoluble fractions. An overall av. recovery of 90.8% for the sum of 12 subfractions and reconstituted CSC was obtained; it is suggested that the major loss occurred during solvent removal.

69-2023 BIOASSAY OF MAJOR FRACTIONS OF CIGARETTE SMOKE CONDENSATE BY AN ACCELERATED TECHNIC. (E.) Bock, F. G. (Roswell Park Mem. Inst., Buffalo, N. Y.), A. P. Swain and R. L. Stedman. Cancer Res. 29(3):584-587, 1969.

Crude or reconstituted cigarette smoke condensate (CSC) and 12 CSC fractions were tested for complete carcinogenic and tumor-promoting activity, in a bioassay method using 60-day-old female ICR Swiss mice, previously painted with 7,12-dimethylbenzanthracene (DMBA; 125 µg in acetone). Significant biological activity was detectable in 40 wk. Significant tumor-promoting activity was detected with crude CSC (58 skin tumors in 30/50 mice), reconstituted CSC (71 tumors in 28/50 mice), a weak acid (phenolic), ether-soluble fraction (48 tumors in 19/50 mice), a neutral, cyclohexane-soluble fraction (8 tumors in 8/50 mice), and a neutral, nitromethane-soluble fraction (38 tumors in 26/50 animals). Some activity was also noted with a neutral, 80% methanol-soluble fraction (4 tumors in 3/50 mice) and possible activity (the tumors developed late) with a basic, ether-soluble fraction (6 tumors in 5/50 mice). In the controls admin. DMBA only, 3 tumors developed in 2/50 mice. The described bioassay procedure is recommended as a guide for the systematic investigation of CSC and other complex carcinogenic materials.

69-2024 THE EFFECTS OF ACTINOMYCIN D AND METHYLCHOLANTHRENE ON THE CYTOLOGY AND RNA AND PROTEIN SYNTHESIS IN PROSTATIC EPITHELIUM GROWN IN VITRO. (E.) Lasnitzki, I. (Strangeways Res. Lab., Cambridge, England). Cancer Res. 29(2):318-326, 1969.

In rat prostate explants, exposure to actinomycin D (AD; 0.15 µg/ml) alone (for 2 days) caused epithelial hyperplasia after a transient period of epithelial breakdown (epithelial breakdown was irreversible at 0.5 µg/ml of AD). Patterns of RNA and protein synthesis suggested the presence of long-lived messenger RNA in the prostatic epithelium. Exposure to 3-methylcholanthrene (MC; 4.0 µg/ml) alone caused epithelial hyperplasia, a gradual increase in RNA synthesis and transient stimulation of protein synthesis. In explants exposed simultaneously to MC + AD (2 days) followed by MC alone (for 4 or 7 days), epithelial hyperplasia was greater than after exposure to MC only. MC also prevented AD-induced cellular damage and partially blocked AD-induced inhibition of nuclear RNA synthesis, possibly by competing with AD for the same nuclear DNA binding sites.

69-2025 ANTI-UTEROTROPHIC RESPONSE OF IMMATURE MICE TO 3-METHYLCHOLANTHRENE. (E.) Newman, W. C. (U. Tennessee Med. Units, Memphis) and R. C. Moon. Nature (London) 22(5175):89, 1969.

In immature female Swiss Webster mice, treatment with 3-methylcholanthrene (MC; 0.15 or 3.0 mg s.c. over 3 days) caused a reduction in uterine wt. (by comparison to untreated controls), whereas treatment with estrone (0.08 or 0.32 µg over 3 days s.c.) caused an increase in uterine wt. It is suggested that MC had an anti-estrogenic or progestational effect.

69-2026 THE MORPHOLOGIC EFFECTS OF ORAL CONTRACEPTIVE AGENTS ON THE CERVIX. (E.) Gall, S. A. (1700 N.W. Tenth Ave., Miami, Fla.), C. H. Bourgeois and R. Maguire. JAMA 207(12):2243-2247, 1969.

Clinical lesions of the cervix were noted in 84% of 103 randomly selected women (19-49 yr. old) using p.o. contraceptives for 1-60 mo. No carcinomas were found, but a few biopsy specimens showed mild epithelial atypia (conization specimens from 3 of these pts. showed atypical squamous metaplasia), and 3 biopsy specimens showed atypical polypoid hyperplasia. The reactivity of the cervix to sequentially admin. contraceptive agents was less than the reactivity to combination agents. The cervical reaction appeared greater in women taking contraceptives for long periods of time, but cervical reactivity tended to decrease in the older women.

69-2027 PHORBOL ESTER TUMOR-PROMOTING AGENTS AND MEMBRANE STABILITY. (E.) Sivak, A. (New York U. Med. Ctr., N. Y.), F. Ray and B. L. Van Duuren. Cancer Res. 29(3):624-630, 1969.

The effects of phorbol esters (PE; from croton oil) on liver lysosomes of female Swiss ICR/Ha mice and female Sprague-Dawley rats, on lysosomes from the 3T3 mouse fibroblast cell line (and 1 of its SV40-transformed sublines), and on skin lysosomes from female ICR/Ha mice were investigated. The PE altered the structure and permeability of the cell membranes of the 3T3 cells, but the lysosomes of these cells (normal or transformed) and of the mouse skin cells were resistant to PE-induced labilization at doses that labilized rat or mouse liver lysosomes in vitro. In vivo exposure of mouse skin for 1 yr. to tumor-promoting doses of PE (3 doses/wk. of 25 µg croton resin p.o.) did not result in lysosomal damage (acid phosphatase and β-glucuronidase distributions in the subcellular fractions were comparable to control values). It is suggested that the tumor-promoting effects of PE are less likely to involve lysosomal stability than interactions with the cell membrane.

69-2028 METABOLISM OF 7-HYDROXYMETHYL-12-METHYLBENZ(a)ANTHRACENE-12-^{14}C IN VITRO. (E.) Jellinck, P. H. (Queen's U., Kingston, Canada) and G. Smith. Biochem. Pharmacol. 18(3):680-682, 1969.

Male hooded or Sprague-Dawley rats were pretreated (24 hr. before sacrifice) with 3-methylcholanthrene (MC), 7,12-dimethylbenzanthracene, (DMBA) and 7-hydroxymethyl-12-methylbenzanthracene (7-OHM-12-MBA; each 10 mg i.p. or p.o. in sesame oil), to study the metabolism and conversion of ^{14}C-labeled DMBA and 7-OHM-12-MBA to water-soluble products by the liver microsomes. Pretreatment with MC or DMBA increased the normal yield of water-soluble products, but 7-OHM-12-MBA did not affect the metabolism of labeled DMBA or 7-OHM-12-MBA. It is concluded that MC and DMBA pretreatment provide another method of protection from adrenal necrosis in the rat.

69-2029 COMPARATIVE BIOLOGIC ACTIVITIES OF 7,12-DIMETHYLBENZ(a)ANTHRACENE, 7-HYDROXYMETHYL-12-METHYLBENZ(a)ANTHRACENE, 7,12-DIHYDROXYMETHYLBENZ(a)ANTHRACENE, AND 4-METHOXY-7,12-DIMETHYLBENZ(a)ANTHRACENE IN THE SPRAGUE-DAWLEY FEMALE RAT. (E.) Sydnor, K. L. (U. Kentucky Sch. Med., Lexington) and J. W. Flesher. Cancer Res. 29(2):403-408, 1969.

The metabolic and toxic effects of 7,12-dimethylbenzanthracene (DMBA) and its 7-hydroxy-, 7,12-dihydroxy- and 4-methoxy- derivatives were studied in female Sprague-Dawley rats (all rats received 1 p.o. dose of about 20 mg). The 7-hydroxy- derivative caused more adrenocortical and hematopoietic damage than DMBA itself, while the 7,12-dihydroxy- and 4-methoxy- derivatives were inactive. DMBA and 4-methoxy-DMBA stimulated liver menadione reductase and N-2-fluorenylacetamide hydroxylase activities. The 7-hydroxy- derivative caused a significant body wt. loss, although liver and spleen wt. were elevated. It is concluded that the hematopoietic and adrenocortical toxicity of DMBA is caused by its metabolite, 7-hydroxy-DMBA.

69-2030 EFFECTS OF 4-NITROQUINOLINE-N-OXIDE ON RNA SYNTHESIS. (E.) Paul, J. S. (U. Texas Southwest. Sch. Med., Dallas), R. C. Reynolds and P.O'B. Montgomery. Cancer Res. 29(3):558-570, 1969.

The effects of 4-nitroquinoline-N-oxide (NQO) on RNA synthesis in HeLa cells resembled the effects of actinomycin D (AD) at low conc. NQO was not as potent an inhibitor of DNA-primed polymerization of RNA as AD, possibly because of the different sizes of the NQO and AD molecules.

69-2031 PRODUCTION OF HYDROGEN PEROXIDE BY 4-HYDROXYAMINOQUINOLINE 1-OXIDE. (E.) Hozumi, M. (Nat. Cancer Ctr. Res. Inst., Tokyo). Gann 60(1):83-90, 1969.

At conc. above 1 µmole/ml, near pH 7.8 and at 37° C, 4-hydroxyaminoquinoline 1-oxide (HAQO; a proximate carcinogenic metabolite of 4-nitroquinoline 1-oxide) showed an unexpected and marked oxygen-dependent production of H_2O_2. Catalase and peroxidase eliminated H_2O_2 from the reaction mixtures containing HAQO. At acidic and alkaline pH, H_2O_2 production was lower and higher, resp., the optimum pH for H_2O_2 production was 8. Less H_2O_2 production was seen with 4-nitroquinoline 1-oxide or 4-aminoquinoline 1-oxide, which suggested a possible role of H_2O_2 in the interaction of HAQO with DNA, proteins and other important cellular constituents which may be involved in HAQO carcinogenesis. It is suggested that a reaction between oxygen and free radicals of HAQO may be involved in the formation of H_2O_2 by HAQO.

69-2032 CHEMICAL LINKAGE OF CARCINOGENIC 3,4-BENZPYRENE TO DNA IN AQUEOUS SOLUTION INDUCED BY PEROXIDE AND IODINE. (E.) Umans, R. S. (Johns Hopkins U., Baltimore, Md.), S. A. Lesko, Jr. and P. O. P. Ts'o. Nature (London) 221(5182):763-764, 1969.

The extent to which a physical complex of ^3H-labeled benzpyrene (BP) and DNA was converted to a chemical complex after 2 hr. of incubation with iodine at room temperature was studied. The results indicated an iodine-induced specific reaction, in which 3,4-BP was chemically linked to DNA while 1,2-BP was not. This conversion was higher with denatured DNA than native DNA (31.5% and 10.5%, resp.). When the same complex was incubated with hydrogen peroxide (37° C for 24 hr.), the presence of ferrous ion greatly enhanced the conversion to a chemical complex. This reaction was also highly specific; the carcinogenic 3,4-BP was chemically linked, whereas the non-carcinogenic 1,2-BP was not.

69-2033 MOLECULAR SITE OF SUBSTITUENTS OF BENZ(a)ANTHRACENE RELATED TO CARCINOGENICITY. (E.) Pataki, J. (U. Chicago, Ill.) and C. Huggins. Cancer Res. 29(3):506-509, 1969.

Male Long-Evans and female Sprague-Dawley rats were treated with benzanthracene (BA) or 26 of its substituted derivatives (i.v. in emulsion or i.m. in soln.) to study structure-activity relationships in adrenal toxicity and the induction of mammary tumors and sarcomas. BA itself did not induce tumors. BA derivatives were highly and equally carcinogenic if they had 2 or 3 methyl groups in any combination at positions 6, 7, 8 or 12, but 1,12-dimethylbenzanthracene (1,12-DMBA) and 3,9-DMBA did not elicit sarcoma. Two derivatives, 7,12-DMBA and 7,8,12-trimethylbenzanthracene (7,8,12-TMBA), were carcinogenic to rats to approx. the same degree, and much more carcinogenic than 3,4-benzpyrene (BP) and 3-methylcholanthrene (MC). BA, BP and MC did not induce adrenal hemorrhage, but 7,12-DMBA and (to a lesser extent) 7,8,12-TMBA were selectively toxic to the adrenal cortex.

69-2034 QUANTITATIVE STUDIES OF IN VITRO TRANSFORMATION BY CHEMICAL CARCINOGENS. (E.) DiPaolo, J. A. (NCI, Bethesda, Md.), P. Donovan and R. Nelson. J. Nat. Cancer Inst. 42(5):867-874, 1969.

Several carcinogenic polycyclic hydrocarbons caused transformation in embryonic Syrian hamster cell cultures. Both the frequency of transformation and the toxicity of the compounds were related to the carcinogenic potency of each compound tested. The most active compounds were 7,12-dimethylbenzanthracene and 3-methylcholanthrene (causing 16.9% and 8.4% transformed clones at 0.1 and 5.0 µg/ml, resp.); 5

compounds caused transformation in 0.6-5.8% of colonies at 10.0 μg/ml, while 2 compounds (pyrene and phenanthrene) were inactive at 20.0 μg/ml. The frequency of transformation increased with an increase in the number of cells exposed, at constant carcinogen conc. Since transformation was observed with carcinogen conc. that decreased cloning efficiency by 50%, it is suggested that induction, rather than selection, was responsible for transformation.

69-2035 MUTAGENIC EFFECT OF 3-HYDROXYKYNURENINE AND 3-HYDROXYANTHRANILIC ACID. (E.) Kuznezova, L. E. (Inst. Exp. Clin. Oncol., Acad. Med. Sci. USSR, Moscow). Nature (London) 222(5192):484-485, 1969.

In cultures of somatic cells from 7-9-wk.-old human embryos, exposure to LD_{40} conc. of 3-hydroxykynurenine and 3-hydroxyanthranilic acid for 24 hr. (50 and 30 mg/liter, resp.) induced chromosomal changes in 13.2% and 12.6% of the cells, resp. (compared to 2.7-3.8% of the cells in control cultures). Chromatid breakage (usually 1 or 2/cell) was seen with both agents; 4 cells showed both breakage and translocations. It is suggested that these tryptophan metabolites induce tumors by a mutagenic mechanism.

69-2036 THE METABOLISM OF THE 8-METHYL ETHER OF XANTHURENIC ACID IN THE MOUSE. (E.) Lower, G. M., Jr. (U. Wisconsin Sch. Med., Madison) and G. T. Bryan. Cancer Res. 29(5): 1013-1018, 1969.

After s.c. or p.o. admin. of ^{14}C-labeled xanthurenic acid 8-methyl ether (XAE; a tryptophan metabolite) to stock female Swiss albino mice and mice maintained under carcinogenic conditions, (admin. 3 doses/wk. of 1 mg for 44 wk. s.c.; labeled XAE was admin. after 120 mg of XAE had been admin.), about 95% of the dose was excreted as unchanged XAE in the urine, feces and CO_2 within 24 hr. under all conditions. Less than 1% of the recovered urinary label consisted of 8-methoxyquinaldic acid, 4-hydroxy-8-methoxy-quinoline, and a third unidentified metabolite, while over 99% was recovered as unchanged xanthurenic acid in mice of both groups. An increased capacity for decarboxylation of XAE to 4-hydroxy-8-methoxy-quinoline was observed in mice kept under carcinogenic conditions. Until its metabolites are tested for bladder and lymphoreticular carcinogenic activity, the question of whether XAE itself is the active carcinogen will remain unanswered.

69-2037 CARCINOGEN-INDUCED CHROMOSOME ABERRATIONS IN HEMATOPOIETIC CELLS OF MICE. (E.) Kurita, Y. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan), H. Shisa, M. Matsuyama, Y. Nishizuka, R. Tsuruta and T. H. Yosida. Gann 60(1):91-95, 1969.

In 3-day-old and 1-mo.-old Swiss and C57BL/6J mice admin. 7,12-dimethylbenzanthracene (DMBA; 60-333 μg/g body wt. s.c.), in 7-day old and 1-mo.-old dd and C57BL/6J mice receiving urethan (U; 0.1-2.0 mg/g body wt. s.c.), and in 3-day-old A/He, DDM. Swiss or C57BL/6J mice admin. 4-nitroquinoline-1-oxide (NQO; 20 μg/g body wt.), the highest occurrence of chromosome aberrations in the bone marrow, thymus and spleen was seen 24 hr. after treatment with DMBA or U, and 10 hr. after treatment with NQO. Changes in the mitotic index varied among organs and among chemicals. No significant sex difference was observed, but age differences (3-day-old Swiss mice showed aberrations in 12.7% of the bone marrow cells, compared to 3.5% of the cells in 1-mo.-old Swiss mice) and strain differences (Swiss mice were much more susceptible to DMBA, and dd mice were more susceptible to U, than C57BL/6J mice; no strain difference was seen with NQO) were seen in some cases. The susceptibility of these mice to induction of chromosomal aberrations seemed to be correlated with their susceptibility to leukemogenesis, although the potency of the carcinogens to induce chromosomal aberrations was not necessarily parallel to their leukemogenic effects.

69-2038 CHARGE TRANSFER IN THE MOLECULAR INTERACTION OF 4-NITROQUINOLINE 1-OXIDE AND RELATED CARCINOGENS WITH DNA AND DEOXYRIBONUCLEOSIDES. (E.) Okano, T. (Tohoku U. Sch. Med., Sendai, Japan), A. Niitsuma, A. Takadate and K. Uekama. Gann 60(1):97-106, 1969.

Analysis of the development of hypochromicity in the spectra of mixed systems of DNA or deoxyribonucleosides with 4-nitroquinoline-1-oxide and 6 related compounds, showed a close positive correlation between the degree of hypochromic effect and the carcinogenic activity of these compounds. Hypochromic changes occurred in the shorter wavelength regions of the DNA and deoxyribonucleoside spectra; in every case, the purine deoxyribonucleosides produced larger changes than the pyrimidine deoxyribonucleosides. The carcinogenic quinolines were apparently bound to DNA mainly by a charge transfer interaction with the base moieties of the macromolecule.

69-2039 COMPARATIVE CYTOPATHOLOGIC ALTERATIONS INDUCED BY ALKYLNITROSAMINES IN NASAL EPITHELIUM OF THE SYRIAN HAMSTER. (E.) Greenblatt, M. (U. Nebraska, Omaha) and K. Rijhsinghani. J. Nat. Cancer Inst. 42(3): 421-433, 1969.

Male Syrian golden hamsters (10-12 wk. old) were treated i.p. with either dimethylnitrosamine (DMN) or diethylnitrosamine (DEN) at doses of 5-320 mg/kg. Toxic changes in the nasal epithelium and other tissues were studied up to 48 hr. later. Both agents were equally effective in inducing olfactory epithelial necrosis when compared on the basis of the mg/kg dosage (they induced necrosis, of dose-related severity, within 48 hr. at all doses above 10 mg/kg); however, DEN induced severe olfactory lesions at 5% of the LD_{50}, whereas DMN induced equivalent lesions only at doses near the lethal level. Doses of DMN which caused alterations in olfactory epithelium also produced hepatic abnormalities. Both agents were selectively toxic for the olfactory epithelium, especially the sensory cells; the cytopathological alterations appeared identical with DMN and DEN. The respiratory type epithelium of the nasal cavity and Jacobson's organ were somewhat resistant to these agents.

69-2040 ELIMINATION OF RADIOACTIVITY AFTER INTRATRACHEAL INSTILLATION OF TRITIATED 3,4-BENZOPYRENE IN HAMSTERS. (E.) Pylev, L. N. (Inst. Exp. Clin. Oncol., Acad. Med. Sci., USSR, Moscow), F. J. C. Roe and G. P. Warwick. Brit. J. Cancer 23(1):103-115, 1969.

In female hamsters inj. intratracheally with ^3H-labeled 3,4-benzpyrene (BP; 5 mg in aminosol vitrum suspension) alone or combined with asbestos (crocidolite) or carbon black, the initial rapid disappearance of radioactivity from the lungs (in the first 3 wk.) was about the same in each group, but after 21 days, more radioactivity was retained by the lungs of animals admin. BP + asbestos or carbon black than by the lungs of animals admin. BP alone. The lungs of animals admin. BP + asbestos or carbon black contained more recoverable macrophages than the lungs of animals admin. BP alone, but the level of radioactivity in each macrophage was higher with BP alone than with BP + carbon black or asbestos. Levels of radioactivity in the liver, kidneys, blood and urine were about the same in all groups; fecal radioactivity decreased earlier after admin. of BP + carbon black (14-21 days after admin.) than after admin. of BP alone (21-28 days after admin.). It is suggested that inhalation of insoluble particulate material, by enhancing the retention of carcinogens, may also enhance their carcinogenic activities.

69-2041 BIOLOGICAL EFFECTS OF THE NEONATAL INJECTION OF 7,12-DIMETHYLBENZ(α) ANTHRACENE. (E.) Ball, J. K. (U. Western Ontario, London, Canada) and D. A. Dawson. J. Nat. Cancer Inst. 42(4):579-591, 1969.

In newborn CFW/D mice admin. 7,12-dimethylbenzanthracene (DMBA; 10-100 µg s.c.), toxic mortality rates were insignificant in mice admin. doses of 30 µg or less, but 30 µg induced thymic lymphomas in 100%. Doses above 30 µg proved lethally toxic (at 50 and 80 µg, mortality rates were 26% and 63%, resp.). Death could be avoided by inj. of syngeneic normal bone marrow cells 7-10 days after DMBA treatment (92-100% survival), even in mice admin. 100 µg of DMBA, but not if bone marrow was admin. after only 3 days (survival rate of 14%). Spleen cells also promoted survival but thymus cells did not (87% and 0% survival rates, resp.). At 12 or 25 µg, DMBA did not affect spleen or whole body wt. or Hb levels for 30 days after admin., but caused a significant decrease in thymus wt. at 8-10 days. The degree of wt. loss was independent of the dose, but the decrease in bone marrow cellularity was dose-dependent (suppression was seen as early as 2 days after either dose). DMBA-induced immunosuppression was reversed by admin. of syngeneic bone marrow or spleen cells from untreated mice, but not by thymus grafts or inj. of spleen or bone marrow cells from treated mice.

69-2042 CARCINOGEN-INDUCED TUMORS OF THE THYMUS. II. LUNG COLONIES AS A MEANS OF SEPARATING DIFFERENT CELL TYPES OF A FUNCTIONAL THYMOMA. (E.) Stutman, O. (U. Minnesota Sch. Med., Minneapolis), E. J. Yunis and R. A. Good. J. Nat. Cancer Inst. 42(5):783-795, 1969.

When cells from a functional thymoma (originally induced by 7,12-dimethylbenzanthracene in a strain A mouse) were inoc. i.v. into normal 50-day-old (A X C57BL/1)F_1 female mice, isolated lung colonies of tumor cells, probably of a clonal nature, were observed in 4-7 days. When these lung tumors were dissected out and implanted s.c. into female strain A mice, 2 different types of colonies were obtained (spindle cell tumors and round cell tumors). A series of 7 spindle cell tumors and 12 round cell tumors derived from the strain A thymoma proved to be nonfunctional (when grafted into thymectomized hosts, none prolonged the survival time or induced immunological restoration). Tumor cell suspensions prepared by *in vitro* mixing of round and spindle cells produced functional thymomas, but inoc. of round cell and spindle cell tumors simultaneously at different sites did not produce functional capacity of the thymoma but required the presence of both cell types of the original tumor, and close contact between these cell types.

69-2043 BIOLOGIC STUDIES ON 7,12-DIMETHYLBENZ (α)ANTHRACENE-INDUCED RAT LEUKEMIA WITH SPECIAL REFERENCE TO THE SPECIFIC CHROMOSOMAL ABNORMALITIES. (E.) Sugiyama, T. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan), Y. Kurita and Y. Nishizuka. Cancer Res. 29(5): 1117-1124, 1969.

Hepatic type leukemia was induced in 82 Long-Evans rats by pulse doses of 7,12-dimethylbenzanthracene (first dose on day 26 after birth, then 3-5 more at 7-12-day intervals).

xamination of chromosome preparations of bone arrow and spleen cells from leukemic animals howed C-1 trisomy (of the longest telocentric hromosome) in 44/82 cells (53.6%); these cells ere similar to erythroblasts and showed arrest f maturation at the polychromatic normoblast tage. Neither cytoplasmic vesicles nor rythroid maturation were demonstrable in cells ith both C-1 and A-6 trisomy. It is suggested hat an unbalanced genetic constitution may be elated to the malignant transformation of the ell.

9-2044 CARCINOGENESIS IN dd/l MICE INJECTED DURING SUCKLING PERIOD WITH URETHANE, ITROGEN MUSTARD N-OXIDE, AND NITROSO-URETHANE. E.) Matsuyama, M. (Aichi Cancer Ctr. Res. nst., Nagoya, Japan), H. Suzuki and T. Nakamura. rit. J. Cancer 23(1):167-171, 1969.

n 7-day-old dd/l mice, treated s.c. with rethan (U), nitrogen mustard N-oxide (NMNO) or -methyl-N-nitrosourethan (MNU) at doses orresponding to 50% of the minimum lethal oses, the results showed that U and NMNO were ultipotent carcinogens, inducing thymic lymphomas, denomas and carcinomas of the lungs (especially), adenomas of the Harderian glands, and (with) liver tumors. MNU was the most potent lung arcinogen of this group, but induced only a mall number of tumors of other organs.

9-2045 RELATION OF THYMIDINE INDEX TO PULMONARY TUMOR RESPONSE IN MICE RECEIVING RETHAN AND OTHER CARCINOGENS. (E.) Shimkin, . B. (Temple U. Sch. Med., Philadelphia, Pa.), . Sasaki, M. McDonough, R. Baserga, D. Thatcher nd R. Wieder. Cancer Res. 29(5):994-998, 1969.

n the lungs of male A/He mice admin. single .p. inj. of urethan (U), nitrogen mustard or -methylcholanthrene, at doses inducing lung umors in 100% of strain A mice (1.0, 0.002 and .05 mg/g, resp.), the thymidine index (a meas-re of DNA synthesis) was reduced after 1 day; recovery and rebound phenomenon was seen after days only in the U-treated mice. The initial eduction of the thymidine index was not seen fter admin. of a lower dose of U, which still an induce lung tumors in 100% of the mice (0.25 g/g), or of 1.0 mg/g of isopropyl carbamate (a ess potent carcinogen than U at 1.0 mg/g). he larger dose of U caused an initial inhibition f the thymidine index in the lungs of C3H and 57BL mice, but the rebound phenomenon was less n these animals than in A/He mice. Actinomycin , cytosine arabinoside and puromycin enhanced he effect of U on the thymidine index, while lightly reducing its carcinogenic effect. It s suggested that inhibition of DNA synthesis eflects a toxic effect of these agents, rather han a key event in lung tumor induction.

69-2046 LUNG TUMOR INDUCTION AND INHIBITION OF BREAST ADENOCARCINOMAS BY HYDRAZINE SULFATE IN MICE. (E.) Toth, B. (U. Nebraska Sch. Med., Omaha). J. Nat. Cancer Inst. 42(3):469-475, 1969.

Hydrazine sulfate (HS), an in vivo metabolite of isonicotinic acid hydrazide, was given throughout life to 6-wk.-old mice of 3 strains (randombred Swiss albino, inbred AKR and inbred C3H) as an 0.012% soln. in the drinking water; HS consumption ranged from 0.63-0.98 mg/day. In HS-treated Swiss mice, 48% of the females and 50% of the males developed lung tumors (compared to 14% and 10%, resp., in controls); lung tumors also developed after HS admin. in 4/40 female and 2/41 male mice of strain C3H. Mammary adenocarcinomas developed in 37.5% of the treated C3H females, compared to an incidence of 76.6% in controls. In AKR mice, the development of malignant lymphomas (normal in AKR mice) was not suppressed by HS (the incidence was 75-82%, compared to 76-96% in controls), and HS did not induce tumors of other types.

69-2047 TUMORIGENESIS WITH ISONICOTINIC ACID HYDRAZIDE AND URETHAN IN THE SYRIAN GOLDEN HAMSTERS. (E.) Toth, B. (U. Nebraska Sch. Med., Omaha) and I. Boreisha. Europ. J. Cancer 5(2):165-171, 1969.

Groups of 5-wk.-old Syrian golden hamsters received urethan (U) or isonicotinic acid hydrazide (INH) or both as a constant additive to their drinking water (0.1%) throughout life. Tumors induced by U alone included dermal melanocytomas, papillomas and carcinomas of the forestomach, adenomatous cecal polyps, adenomas of the lung and a wide variety of other tumors. INH alone was not carcinogenic, even to the lungs (in contrast to the results observed in mice). Simultaneous admin. of U + INH did not significantly increase the incidence of tumors (by comparison to the effects of either agent alone).

69-2048 RELATIONSHIP OF EXPERIMENTALLY INDUCED INTESTINAL TUMORS TO LAXATIVE INGESTION. (E.) Cleveland, J. C. (Yale U. Sch. Med., New Haven, Conn.) and J. W. Cole. Cancer 23(5):1200-1203, 1969.

Wistar rats were treated repeatedly with 3:2'-dimethyl-4-aminodiphenyl (0.5 ml/wk. s.c.), and some were also treated with magnesium sulfate ($MgSO_4$; 5% soln.) in the drinking water. Admin. of the laxative caused watery diarrhea and reduced the av. stomach-to-anus transit time of carmine red, but did not affect the incidence of intestinal tumors. Adenomas or adenocarcinomas of the large or small intestine developed in 5/13 rats (38%) receiving $MgSO_4$ and in 5/11 (45%) receiving only the carcinogen;

the difference was not significant. It is concluded that neither the length of contact time nor the carcinogen conc. (as affected by laxative ingestion) affected the induction of tumors of the colon.

69-2049 THE INDUCTION OF TUMOURS IN THE RAT BY A SINGLE ORAL DOSE OF N-NITROSOMETHYLUREA. (E.) Leaver, D. D. (Med. Res. Coun. Lab., Carshalton, England), P. F. Swann and P. N. Magee. Brit. J. Cancer 23(1):177-186, 1969.

In Porton strain Wistar rats, admin. of a single p.o. dose of N-nitroso-N-methylurea (90 mg/kg) induced tumors in 27/31 (15/27 kidney; 24/27 squamous stomach; 8/27 skin; 2/27 jaw; 6/27 and 16/27 small and large intestine, resp.). Nine rats died within 1 mo. of treatment; the tumor-bearing rats died or were sacrificed 18-61 wk. after treatment. The first tumors of the stomach and small intestine developed after 10 wk.; the first tumors of the kidney, skin and large intestine appeared after 20 wk. Early toxic lesions (seen at 2-164 hr. after treatment) were primarily found in the thymus, bone marrow and lymph nodes.

69-2050 RELATIONSHIP OF LEUKEMIA TO LUNG AND STOMACH TUMORS IN MICE FED BENZO(a) PYRENE. (E.) Rigdon, R. H. (U. Texas Med. Br., Galveston) and J. Neal. Proc. Soc. Exp. Biol. Med. 130(1):146-148, 1969.

In 18 30-day-old CFW white Swiss mice, feeding of 3,4-benzpyrene (0.25 mg/g diet) for 80-140 days induced stomach tumors in 69/108, leukemia in 40/108 and lung tumors in 52/108 (20/52 mice had 15 or more lung tumors). In the 68 mice without leukemia, a negative statistical relationship was noted between the occurrences of lung adenomas and stomach tumors (24/68 and 61/68, resp.). Mice with leukemia had a high rate of lung tumors (28/40) and a low rate of stomach tumors (8/40).

69-2051 THE EFFECT OF CORTISONE THERAPY AND LIMB EXERCISE ON THE DISSEMINATION OF CANCER VIA THE LYMPHATIC SYSTEM. (E.) Stoker, T. A. M. (Westminster Hosp., London). Brit. J. Cancer 23(1):132-135, 1969.

The pattern of metastatic growth evident 21 days after intralymphatic inj. of 10^6 viable Vx2 carcinoma cells (into the popliteal afferent lymphatic vessel) was investigated in untreated, cortisone-treated (25 mg i.m., 2 days and 24 hr. before tumor cell inoc.) and passively exercised limbs (after tumor inoc.) of male and female New Zealand white rabbits. Popliteal lymph node tumors developed in 12/15, 7/15 and 6/15 animals; 1/15, 8/15 and 1/15, resp., showed tumors of both the popliteal and pelvic lymph nodes. In the exercised group, 6/15 showed tumors of both lymph node chains as well as lung tumors.

69-2052 CARCINOGENIC ACTION OF ELAIOMYCIN IN RATS. (E.) Schoental, R. (MRC Lab., Carshalton, England). Nature (London) 221(5182): 765-766, 1969.

Elaiomycin (E; a metabolite of Streptomyces hepaticus) was lethally toxic to weanling and newborn rats at doses over 50 mg/kg. Lower dosages of E (1 dose of 10-35 mg/kg; in some rats, 2-6 additional doses of not more than 30 mg/kg over the next 10 mo., i.p. or p.o.) allowed survival times up to 28 mo. in 1 experiment; in another experiment, the rats were sacrificed at age 18-22 mo. Rats of both groups showed a variety of tumors at autopsy: adenocarcinomas of the kidney, upper jejunum, stomach and uterus, sarcoma of the liver, 2 oligodendrogliomas of the brain, 1 thymoma and 2 s.c. sarcomas were attributed to E. The carcinogenic action of E resembled the effects of N-methyl-N-nitrosourethan, N-methyl-N-nitrosoguanidine and their congeners.

69-2053 ZOXAZOLAMINE-HYDROXYLASE INDUCING EFFECT OF POLYCYCLIC AROMATIC HYDROCARBONS; RELATIONSHIPS BETWEEN STRUCTURE AND ACTIVITY, AND DEGREE OF CORRELATION WITH CARCINOGENICITY. (E.) Buu-Hoï, N. P. (U. Paris) and Do-Phuoc Hien. Biochem. Pharmacol. 18(4):741-748, 1969.

The hepatic zoxazolamine hydrolase (ZH)-inducing effects of 33 carcinogenic and 23 non-carcinogenic polycyclic aromatic hydrocarbons (containing 3-7 rings) were studied in 3-mo.-old male Wistar rats. Several structure-activity relationships were noted, but no close correlation between ZH-inducing activity (25/33 of the carcinogens were active inducers) and carcinogenicity was found. However, some pattern of molecular action seemed to be common to both the carcinogenic and the ZH-inducing compounds; for example, the presence of electron-accepting substituents reduced or abolished both types of activity.

69-2054 EFFECT OF AN EXTRACT OF UV-IRRADIATED LINOLENIC ACID ON AZO DYE CARCINOGENESIS. (E.) Mulay, A. S. (NCI, Bethesda, Md.), R. W. O'Gara, H. J. Anderson, L. D. Saslaw and V. S. Waravdekar. Cancer Res. 29(2):373-379, 1969.

Male Osborne-Mendel rats received 1-4 i.p. inj. of an aqueous extract of UV-irradiated linolenic acid (UV-LA; 1 dose/mo. of 120-600 thiobarbituric acid U/kg). Some of these rats were also fed 4-dimethylaminoazobenzene (DAB) at subcarcinogenic doses for 4 mo. (0.12% in diet), beginning at the time of the first inj. of UV-LA; the results were studied 2 mo. after the end of treatment. High doses of UV-LA (400 U or more) caused chronic toxicity, liver swelling, lobal fusion and adhesions. All rats admin. DAB for 4 mo., together with 3-4 inj. of UV-LA, developed cholangiofibrosis, and 25% of these eveloped hepatoma nodules. Hepatic levels of everal oxidases, dehydrogenases and phosphatases these animals were 25-40% lower than in con- rols. Admin. of either DAB or UV-LA alone did ot induce cholangiofibrosis or hepatomas. It suggested that the toxic principle of UV-LA educed the number of liver cells able to etoxify DAB.

-2055 LIVER GROWTH ASSOCIATED WITH THE INDUCTION OF DEMETHYLASE ACTIVITY TER INJECTION OF 3-METHYLCHOLANTHRENE IN MATURE RATS. (E.) Argyris, T. S. (Syracuse , N. Y.) and D. L. Layman. *Cancer Res.* (3):549-553, 1969.

immature rats, a single i.p. inj. of 3-methyl- olanthrene (MC; 1 mg) increased the activity azo dye demethylase (both the activity/g ver and the activity/100 g body wt., suggest- g an increase in liver mass). Both wet and y liver wt. increased after MC admin.; the creased levels were significant up to day 10. otal homogenate protein increased significantly to day 4 (peaking at 30-40% above control lues). Liver DNA content and nuclear counts creased up to days 3 and 2 after MC admin., sp.; the mitotic activity of the hepatocytes s significantly increased only on day 2 after treatment. These parameters of liver cell oliferation began to decrease 5-7 days after inj., reaching control values by day 14; is was paralleled by a decrease in azo dye emethylase activity.

-2056 DIETARY INDUCTION OF SOME ENZYMES OF AMINO ACID METABOLISM DURING 2-ACETYL- INOFLUORENE FEEDING. (E.) Poirier, L. A. . Wisconsin Sch. Med., Madison) and H. C. tot. *Cancer Res.* 29(2):464-469, 1969.

the livers of protein-depleted male Holtzman ts fed diets containing N-2-fluorenylacetamide -acetylaminofluorene; 0.03% in diet) for 4-5 ., the responses of several hepatic enzymes amino acid metabolism (tyrosine α-ketoglu- arate transaminase, serine dehydratase, ryptophan pyrrolase, histidase, ornithine- elta-transaminase) to induction by casein ydrolysate were modified in ways which partially esembled the altered control mechanisms seen hepatocellular carcinomas.

-2057 DIETARY INDUCTION OF SOME ENZYMES OF AMINO ACID METABOLISM DURING AZO DYE EEDING. (E.) Poirier, L. A. (U. Wisconsin ch. Med., Madison) and H. C. Pitot. *Cancer es.* 29(2):475-480, 1969.

he initial and casein hydrolysate-induced evels of several enzymes of amino acid etabolism were studied in the livers of male ats fed a carcinogenic azo dye (N,N-dimethyl-3'-methyl-4-aminoazobenzene) or its non-carcinogenic isomer, N,N-dimethyl-2-methyl-4-aminoazobenzene (0.054% in diet for both compounds) for up to 5 wk. In the carcinogen-treated rats, the inducibilities of tryptophan pyrrolase and tyrosine transaminase remained unchanged (even after 5 wk. of treatment), but the inducibilities of histidase and ornithine transaminase apparently disappeared after 2-3 wk. of treatment (the initial levels of these enzymes were also significantly reduced); the initial level of serine dehydratase was above normal, but its inducibility was reduced. In the livers of rats fed the non-carcinogenic azo dye, the only difference from normal was a reduction in the inducibilities of tyrosine transaminase and serine dehydratase.

69-2058 DIETARY INDUCTION OF SOME ENZYMES OF CARBOHYDRATE METABOLISM DURING 2-ACETYLAMINOFLUORENE FEEDING. (E.) Poirier, L. A. (U. Wisconsin Sch. Med., Madison), M. C. Poirier and H. C. Pitot. *Cancer Res.* 29(2): 470-474, 1969.

In the livers of male Holtzman rats fed grain diets containing N-2-fluorenylacetamide (2-acetylaminofluorene; 0.03% in diet) for 2-5 wk., the normal metabolic responses of several hepatic enzymes of carbohydrate and lipid metabolism (glucokinase, glucose-6-phosphate dehydrogenase, 6-phosphogluconate dehydrogenase, malic enzyme, citric cleavage enzyme) to dietary induction were lost; this pattern of enzyme metabolism resembled that seen in certain hepatomas.

69-2059 MECHANISM OF CARCINOGENESIS WITH 1-ARYL-3,3-DIALKYLTRIAZENES. ENZYMATIC DEALKYLATION BY RAT LIVER MICROSOMAL FRACTION *IN VITRO*. (E.) Preussmann, R. (Max Planck Inst. Immunbiol., Freiburg/Br., Germany), A. von Hodenberg and H. Hengy. *Biochem. Pharmacol.* 18(1):1-13, 1969.

Since p.o. admin. of 1-phenyl-3,3-dimethyltriazene (I) to rats did not cause tumors of the stomach (although it induces CNS tumors), this agent was thought to be a resorptive carcinogen, and that activation to form the proximate carcinogen does not occur simply by chemical scission of the triazene. In this study, compound I and 15 other triazenes were incubated *in vitro* with microsomal fractions from rat liver *and other* organs in the presence of a NADPH (reduced nicotinamide adenine dinucleotide phosphate)-generating system. In the presence of oxygen, the carcinogenic compound I and certain other triazenes were dealkylated to form the corresponding aldehydes. Aniline was also formed after dealkylation of compound I by liver microsomes *in vitro*. It was postulated that the aryldialkyltriazenes are dealkylated *in vivo* to form aryl-monoalkyl triazenes as triazenes as proximate carcinogens, and that the carcinogenic activity of these triazenes is caused by in vivo alkylation of biopolymers, probably nucleic acids.

69-2060 THE EFFECT OF BENZO(a)PYRENE DERIVATIVES UPON DRUG METABOLISING ENZYME ACTIVITIES. (E.) Dewhurst, F. (Leicester Reg. Coll. Tech., England) and D. A. Kitchen. Biochem. Pharmacol. 18(4):942-945, 1969.

The effect of several 6-substituted benzo(a)pyrene (3,4-benzpyrene; BP) derivatives (1 mg i.p. in peanut oil) on the duration of zoxazolamine paralysis and hexobarbital hypnosis was studied in female Schofield mice. Only 1 compound (6-hydroxymethyl-BP) significantly stimulated hexobarbital metabolism (measured by hypnosis time), while most of the compounds stimulated zoxazolamine metabolism (measured by paralysis time). The parent polycyclic aromatic hydrocarbon system could apparently be substituted with a range of electron-donating or electron-accepting groups, without losing the ability to induce the synthesis of certain drug-metabolizing enzymes. The potential value of this phenomenon is discussed in view of the fact that most substituents (other than amino and alkyl) appear to decrease the carcinogenicity of the polycyclic aromatic hydrocarbons.

69-2061 STUDIES ON THE INCORPORATION OF L-ETHIONINE-ETHYL-L-^{14}C INTO THE TRANSFER RNA OF RAT LIVER. (E.) Ortwerth, B. J. (Oak Ridge Nat. Lab., Tenn.) and G. D. Novelli. Cancer Res. 29(2):380-390, 1969.

In mixed transfer RNA (tRNA) fractions from the livers of rats inj. with ^{14}C-labeled ethionine (2 doses of 50 µC, 24 hr. apart), tRNA labeling reached 200 cpm/A$_{260}$; DNA labeling was insignificant after removal of RNA and protein. After 1 inj. of labeled ethionine, tRNA labeling increased linearly from 1-12 hr.; it reached a max. at 24 hr., and decayed with a half-life of 2.5 days. The ethylation of tRNA by labeled ethionine did not seem to proceed like normal methylation, since S-adenosylethionine (S-AE) was not the active intermediate. The S-AE content of liver at 24 hr. (when no ethylation was noted) was similar to or greater than the S-AE content at 3 hr. (when ethylation was at max. levels). A 10-fold excess of ^{12}C-labeled methionine increased tRNA labeling by ^{14}C-ethionine, even though methionine may inhibit S-AE formation. An in vitro system which functioned well for tRNA methylation with S-adenosylmethionine, did not ethylate tRNA with S-AE. The distributions of radioactivity (across an RPC 2 chromatogram) of tRNA labeled with ethionine-ethyl-1-^{14}C and tRNA labeled with methionine-methyl-^{14}C were widely different.

69-2062 THE INHIBITORY EFFECT OF 3-METHYLCHOLANTHRENE ON NUCLEOLAR ALTERATIONS INDUCED IN RAT LIVER CELLS BY 3'-METHYL-4-DIMETHYLAMINOAZOBENZENE. (E.) O'Hegarty, M. T. (U. Coll. Sch. Med., Dublin) and J. W. Harman. Cancer Res. 29(3):521-528, 1969.

In male Wistar rats fed 3'-methyl-4-dimethylaminoazobenzene (3'-MeDAB) for 1-4 wk., several morphological changes (primarily "stripping" of the nucleolus-associated chromatin by an apparently structureless electron-dense zone) were seen in the nucleolar portion of the hepatic parenchymal cells. These changes were not seen in liver cells from untreated controls or rats fed 3-methylcholanthrene (MC) only; simultaneous feeding of MC and 3'-MeDAB resulted in very few nucleolar abnormalities, indicating a protective effect of MC.

69-2063 STABILITY OF BINDING OF LABEL FROM N-HYDROXY-N-2-FLUORENYLACETAMIDE TO INTRACELLULAR TARGETS, PARTICULARLY DEOXYRIBONUCLEIC ACID IN RAT LIVER. (E.) Szafarz, D. (NCI, Bethesda, Md.) and J. H. Weisburger. Cancer Res. 29(4):962-968, 1969.

Inbred Fischer rats were treated with ^{14}C-labeled N-hydroxy-N-2-fluorenylacetamide (N-OH-FAA;1.5 mg/100 g body wt. i.p., or 160 ppm in the diet for 2 or 10 wk.). The rats were sacrificed 1 hr.-160 days after the end of treatment and the stability of the binding of radioactive metabolites in the liver was studied. After a single inj. of N-OH-FAA, peak activity bound to DNA was seen at 1 hr.; it decreased thereafter until no radioactivity could be detected at day 12. When N-OH-FAA was admin. in the diet, the initial peak value of carcinogen bound to DNA, cytoplasmic supernatant and microsomes was 1.5-fold higher after 2 wk. than after 10 wk., but the rates of decrease in the first few days after N-OH-FAA feeding was stopped were about the same in the 2 groups. The half-life of the remainder of the bound N-OH-FAA was prolonged in the 10-wk. feeding group, suggesting that the carcinogen might interfere for a long time with the normal activity of DNA.

69-2064 METABOLISM OF THE GLUCURONIDE OF N-HYDROXY-2-ACETYLAMINOFLUORENE IN THE RAT. (E.) Irving, C. C. (U. Tennessee, Memphis) and R. Wiseman, Jr. Cancer Res. 29(4):812-816, 1969.

Albino Holtzman rats were admin. the ^{14}C-labeled glucuronide of N-hydroxy-N-2-fluorenylacetamide (N-hydroxy-2-acetylaminofluorene; 4.0 mg/100 g body wt.) p.o., i.p., or s.c. Although urinary excretion of the label after 6 hr. was higher after s.c. and i.p. inj. (35-38%) than after p.o. admin. (9%), and although fecal excretion of the label after 72 hr. was greater (45%) after p.o. admin. than after i.p. or s.c. inj. (24%), total 24-hr. urinary + fecal excretion rates were about the same with each admin. route. The route of admin. markedly influenced the nature of the urinary metabolites of this compound; the least amount of metabolic change was seen after s.c. inj. Total urinary label excretion in s.c.-treated rats was 49%; after bile duct cannulation it was 31%. After 24 hr., 58% of the radioactivity was excreted in the bile; 92% of this was the unaltered glucuronide.

69-2065 INACTIVATION OF TISSUE-SPECIFIC INHIBITORS BY A CARCINOGEN (DIETHYLNITROSAMINE). (E.) Volm, M. (German Cancer Res. Ctr., Heidelberg, Germany), V. Kinzel, U. Mohr and R. Süss. Experientia 25(1):68-69, 1969.

Supernatants from normal adult rat liver (containing soluble liver proteins) significantly inhibited DNA synthesis in liver and kidney explants from newborn rats and in tissue culture cells (including Walker 256 carcinoma, HeLa, amelanotic melanoma and L cells). Liver supernatants from diethylnitrosamine (DENA) treated rats (containing DENA-binding h-protein) inhibited DNA synthesis in the tissue culture cells and in the kidney explants, but the depression of DNA synthesis in liver explants was significantly less than the inhibition seen with preparations from control rats.

69-2066 THE SEX-DEPENDENT DIFFERENCE IN THE DEVELOPMENT OF LIVER TUMORS IN MICE ADMINISTERED DIMETHYLNITROSAMINE. (E.) Vesselinovitch, S. D. (Chicago Sch. Med., Ill.). Cancer Res. 29(5):1024-1027, 1969.

In 7-day-old (C57BL x C3H)F_1 mice admin. 6 inj. of dimethylnitrosamine (1.0-4.0 μg/g body wt., at 3-day intervals, i.p.) and sacrificed at 66 wk., a positive dose-response relationship was noted for the induction of hepatomas, hepatocarcinomas, hemangiomas and adenomas of the lung. Most of the tumors were seen in the liver. The incidence of liver cell tumors showed a sex-dependent increase with dosage, from 44.4-93.5% in males and 6.2-43.4% in females. Liver tumors were significantly more frequent in males (75%) than in females (28%), suggesting the action of a hormonal factor.

69-2067 INDUCTION OF LIVER TUMOR IN MICE INJECTED AT BIRTH WITH LIVER TUMOR EXTRACT. (E.) Imaizumi, T. (Cancer Inst., Tokyo). Gann 60(1):119-120, 1969.

An RNA-containing phenol extract of a hepatocellular carcinoma induced in an ICR mouse by N,N'-(fluoren-2,7-ylene)bisacetylamine, was inj. s.c. (0.05 ml RNA, conc. 10 mg/ml) into 13 newborn male ICR (Hauschka) mice. Liver tumors developed in 7/8 of the 18-mo. survivors (3 hepatocellular carcinomas, 4 adenomas) and 1 mouse developed liver cysts. No liver tumors were seen in the 7/10 untreated controls that survived for 18 mo. The neoplastic transformation induced by this RNA extracted from a chemically induced tumor was compared to the transformation induced by RNA-containing tumor viruses.

69-2068 INFLUENCE OF ESTROGENS AND ENDOCRINE ABLATION ON DURATION OF REMISSION PRODUCED BY OVARIECTOMY OR ANDROGEN TREATMENT OF 7,12-DIMETHYLBENZ(a)ANTHRACENE-INDUCED RAT MAMMARY TUMORS. (E.) Teller, M. N. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.), R. J. Kaufman, M. Bowie and C. C. Stock. Cancer Res. 29(2):349-352, 1969.

See also abstract nos.: 1989,1999,2000,2005,2011,2114,2123,2124,2125,2132,2167,2176, 2181,2182,2184,2189

69-2069 TRANSMISSION OF VIRAL INDUCED CAVIAN LEUKEMIA BY THE ORAL ROUTE. (E.) Opler, S. R. (Stanford U. Sch. Med., Palo Alto, Calif.). Oncology 22(4):273-280, 1968.

A 20% suspension of homogenized spleen cells from leukemic guinea pigs was force-fed 7 wk. (1-2 doses/wk.) to inbred (strain 2) and hybrid (F_1) leukemia-susceptible guinea pigs (1 day-over 1 yr. old). After varying latent periods, acute leukemia developed in 18/20 inbred and 12/19 hybrid animals. No leukemia developed in 16 controls fed heat-inactivated material, or in 8 controls fed human leukemic material. Electron microscopic examination showed characteristic cellular changes, together with both mature and immature virus particles in the leukemic cells. The virus was resistant to trypsin, and was apparently able to penetrate through presumably intact cell layers as an infectious unit.

69-2070 TRANSMISSION EXPERIMENTS WITH LYMPHOCYTIC SARCOMA OF THE MOUSE. (E.) Tokuzen, R. (Nat. Cancer Ctr. Res. Inst., Tokyo) and W. Nakahara. Cancer Res. 29(3):730-733, 1969.

A lymphocytic sarcoma, isolated from an axillary lymph node of a female ddN mouse, differed from previously described mouse lymphocytic sarcomas in its selectivity for the lymph nodes. After i.p. or s.c. transplantation (in young adult ddN mice), the tumor spread only to the lymph nodes; no involvement of the spleen, liver or bone marrow was noted. Seitz filtrates of this tumor (inoc. i.p.) induced lymph node tumors in 63/448 (14.1%) newborn and 5/43 (11.6%) young adult ddN mice. Particles closely resembling mouse leukemia virus were noted under the electron microscope.

69-2071 TRANSMISSIBLE FELINE FIBROSARCOMA. (E.) Snyder, S. P. (U. California, Davis) and G. H. Theilen. Nature (London) 221(5185):1074-1075, 1969.

Tumor tissue from a 2-yr.-old female cat with multiple s.c. fibrosarcomas, was frozen and stored at -70° C for 6 mo., then inoc. s.c. into 2-day-old kittens. Multiple fibrosarcomas developed at the site of inoc. in 5/5 kittens (1/5 developed multiple metastases) after a latent period of 20-61 days. A second passage with 220 mμ or 450 mμ Millipore filtrates of the tumors gave similar results in 3 newborn kittens and 1 newborn puppy, with a latent period of 10-15 days. The original and transplanted tumors were histologically similar. Electron microscopic examination of the tumor tissues showed many budding type C virus particles, which were morphologically similar to particles of avian and mouse sarcomas and feline leukemia viruses.

69-2072 HOST RESISTANCE AGAINST ISOTRANSPLANTATION OF LYMPHOMAS INDUCED BY THE RADIATION LEUKAEMIA VIRUS. (E.) Haran-Ghera, N. (Weizmann Inst. Sci., Rehovot, Israel). Nature (London) 222(5197):992-993, 1969.

Inoc. of the radiation leukemia virus (RadLV; isolated from radiation-induced lymphomas in C57BL mice) into the thymus of adult male C57BL mice (8-10 wk. old) induced host resistance to s.c. isotransplantation of RadLV-induced leukemia cells 1 mo. later; no host resistance was seen in mice inoc. s.c. or i.v. with RadLV. The comparatively low incidence of tumors in mice in which the virus was inoc. into the kidney suggested that organs other than the thymus might serve as effective routes for the admin. of virus to induce immunization in adult mice. When RadLV was inoc. s.c., i.v. or into the spleen, it could not be isolated from the thymus, even at 1 mo. after inoc. Newborn mice could be immunized by i.p. inoc. of RadLV.

69-2073 RELATIONSHIP BETWEEN VIRION INCIDENCE AND PATHOLOGICAL STAGE IN VIRUS-INDUCED LEUKAEMIA. (E.) Rich, M. A. (Albert Einstein Med. Ctr., Philadelphia, Pa.), R. Siegler and L. W. Johns. Nature (London) 221(5183):868-869, 1969.

Newborn ICR/Ha Swiss mice were inoc. i.p. with the Rich mouse leukemia virus (RLV); 70 days later the left and right thymuses were examined under the electron and light microscope. Four stages of the infection were described. In Stage I, both thymuses were of equal wt. and showed no histological changes. In Stage II (depletion), one thymus was of lower wt. than the other and showed loss of cortical lymphocytes and contracture of the thymic epithelial cells. In Stage III (lymphoma *in situ*), lymphoblasts filled the entire thymus which showed architectural disorganization. In Stage IV (overt lymphoma), the thymus was at least 3 times its normal wt. and filled with lymphoblasts, with tumor cells disseminated to the opposite thymus and other organs. More than 15% of the fields from thymuses of leukemic mice contained RLV particles; the total number of virions and the number of fields containing virions were proportional to the stage of leukemogenesis. The possibility that the virions were synthesized *in situ* was suggested.

69-2074 PORPHOBILINOGEN AND PORPHYRIN SYNTHESIS IN SPLENOMEGALY OF SOME MURINE LEUKEMIAS. (E.) Fields, L. A. (NCI, Bethesda, Md.), S. Vadlamudi, V. S. Waravdekar and

A. Goldin. Proc. Soc. Exp. Biol. Med. 130(2): 372-376, 1969.

In BALB/c, DBA/2 and BDF_1 mice inoc. i.p. with Friend leukemia virus (FLV), the resulting increase in splenic Δ-aminolevulinic acid dehydratase (DALAD) activity (increases in porphobilinogen and porphyrin synthesis were also noted) proved as sensitive as the increase in spleen wt. in indicating the extent of FLV infection. Mice of the FLV-resistant C57BL/6 strain did not develop splenomegaly and showed little change in these parameters of erythropoietic activity. Little change in DALAD activity was noted in the spleens of DBA/2 mice with splenomegaly induced by inoc. of L-1210 leukemia cells.

69-2075 A SYSTEM FOR QUANTITATIVE STUDIES ON INTERACTIONS BETWEEN FRIEND LEUKEMIA VIRUS AND HEMOPOIETIC CELLS. (E.) Thomson, S. (Ontario Cancer Inst., Toronto, Canada). Proc. Soc. Exp. Biol. Med. 130(1):227-232, 1969.

The recovery of Friend leukemia virus (FLV) from the spleens of irradiated (900 rads) 5-10-wk.-old inbred SIM/McK mice was reduced by a factor of 10^4 up to 9 days after inoc (compared to levels of FLV isolated from the spleens of non-irradiated animals). When normal syngeneic spleen or bone marrow cells were added to the virus prior to inoc. into irradiated mice, FLV recovery was increased 20-100-fold (indicating restoration of FLV replication). A further increase in FLV yield was obtained by prior *in vitro* incubation of the virus with spleen or bone marrow cells (for 30 min. at 37° C), but not with lymph node, liver, kidney or thymus cells. In the spleens of heavily irradiated mice inoc. with FLV and spleen or bone marrow cells, the total cell count (including tumor cell colony-forming foci) was 5-10-fold higher than in the spleens of mice inoc. with FLV alone. It is concluded that the myelopoietic cells are the target cells for FLV replication and leukemic transformation. A sequential combination of *in vitro* and *in vivo* systems is recommended for the study of the interaction of hematopoietic cells with FLV.

69-2076 PROTECTION OF C58 MICE BY NORMAL MURINE TISSUES AGAINST TRANSPLANTABLE LEUKEMIA, LINE I_b. (E.) Han, I. H. (U. Michigan, Ann Arbor), A. G. Johnson and W. H. Murphy. J. Nat. Cancer Inst. 42(5):815-824, 1969.

In 7-8-wk.-old C58 mice, inj. of spleen, lymph node, thymus and liver homogenates (but not brain, muscle, whole blood cells or serum) from mice of several Gross virus antigen-negative (G-) strains (BALB/wm, DBA/2J, C3H/HeJ and C57BL/6J) conferred protection against line I_b leukemia. A low degree of protection was conferred by homogenates of tissues from AKR mice (G+); syngeneic C58/wm or C58/j (G+) tissue homogenates had no effect. Spleen cells from immune C58 mice (previously inj. with BALB homogenates and challenged with I_b leukemia cells) conferred passive protection to normal syngeneic C58/wm mice. Protection could not be induced in irradiated C58 mice by admin. of BALB spleen homogenates before challenge with I_b cells, indicating that the protection resulted from active immunization of the C58 mice. The protective factor was contained in the mitochondrial fraction. It was heat- and trypsin-sensitive, but resistant to DNase and RNase. The protective factor was apparently independent of the G antigen or Gross leukemia virus infection.

69-2077 COMPARISON OF THE BIOLOGIC AND BIOPHYSICAL PROPERTIES OF THE PROGENY OF INTACT AND ETHER-EXTRACTED RAUSCHER LEUKEMIA VIRUSES. (E.) Shibley, G. P. (C. Pfizer Co., Maywood, N. J.), F. J. Carleton, B. S. Wright, G. Schidlovsky, J. H. Monroe and S. A. Mayyasi. Cancer Res. 29(4):905-911, 1969.

Infectious viral nucleoids were obtained in the aqueous phase after treatment of Rauscher leukemia virus (RLV) with chilled ethyl ether for short periods of time. Newborn mice of several strains (BALB/c, C3H, IcR, DBA/2 and DBF-1) developed typical leukemia after intracranial inoc. of 0.02 ml of the ether-extracted RLV, but C57/BL mice were refractory to both the intact and the ether-extracted infectious preparations. The ether-extracted preparation was of higher buoyant density than the intact preparation, and consisted entirely of RLV particles without envelopes. The ether-extracted virus was not neutralized by serum prepared against intact RLV, but was inactivated by RNase; it contained less RNA and protein than the intact RLV.

69-2078 AN IMMUNOCHEMOTHERAPEUTIC SYSTEM FOR THE TREATMENT OF A TRANSPLANTED MOLONEY VIRUS-INDUCED LYMPHOMA IN MICE. (E.) Glynn, J. P. (NCI, Bethesda, Md.), B. L. Halpern and A. Fefer. Cancer Res. 29(3):515-520, 1969.

Admin. of allogeneic cells specifically sensitized to the Moloney leukemia virus (MLV)-induced transplantation antigen(s) (spleen cells from CDF mice inoc. with irradiated tumor cells), combined with cyclophosphamide (Cytoxan) admin., eradicated MLV-induced lymphoma in a large percentage of treated BALB/c mice (only 5/20 had gross evidence of tumors at death, while 8/20 survived 70 days without disease). While cyclophosphamide alone caused marked increases in the survival time, it did not eradicate the tumor. Treatment with the sensitized allogeneic cells alone had no effect.

69-2079 EFFECT OF STATOLON ON ACUTE AND PERSISTENT MURINE LEUKEMIA AND SARCOMA VIRUS INFECTIONS. (E.) Rhim, J. S. (NIH, Bethesda, Md.), R. J. Huebner and S. Gisin. Proc. Soc. Exp. Biol. Med. 130(1):181-187, 1969.

The growth of Friend leukemia and Moloney sarcoma (MSV) viruses in mouse embryo cell cultures was markedly inhibited when the cells were pretreated for 24 hr. with Statolon (S; double-stranded phage RNA; 100 µg/ml). No complement-fixing (CF) antigen was detected after 14 and 21 days of incubation. The MSV-induced *in vitro* transformation was also strongly inhibited. The inhibition of focus-forming and CF titers (also observed with different pseudotypes of MSV) increased with the conc. of Statolon, but conc. higher than 100 µg/ml were toxic for mouse embryo cells. Best results were seen when S (50 µg/ml) was incubated with the cells for 24 hr. before virus inoc., but inhibition was also noted when S was added at the same time as the virus or 24 hr. later. No significant inhibition was noted when S was added 48 hr. after the virus. Other studies demonstrated that S was heat-labile and had no direct virucidal effect (when added to a MSV suspension); instead, it acted upon the host cells by inducing interferon. In rat embryo cells infected with Rauscher leukemia virus (RLV), a single pretreatment with S (100 µg/ml) decreased the CF titer more than 4-fold in 2 wk. Prolonged exposure of RLV-infected rat embryo cultures to S (25 µg/ml) completely inhibited RLV multiplication.

69-2080 EFFECT OF CYTOSINE ARABINOSIDE ON THE REPLICATION OF THE MOLONEY SARCOMA VIRUS IN 3T3 CELL CULTURES. (E.) Hirschman, S. Z. (NCI, Bethesda, Md.), P. J. Fischinger, J. J. Zaccari and T. E. O'Connor. J. Nat. Cancer Inst. 42(3):399-411, 1969.

In Moloney mouse sarcoma virus (MSV)-infected 3T3 mouse embryo cells, exposed to cytosine arabinoside (ara C; 10^{-3} -10^{-5} M) during the initial 16 hr. after MSV adsorption, no virus growth was detectable after 48 hr. of incubation. Some MSV was recovered, however, after 7 days of incubation, indicating that MSV could exist in the host cell in a non-detectable form, but still capable of later replication. Deoxycytidine (10^{-3} M) reversed the DNA synthesis-inhibiting action of ara C (10^{-5} M) in 3T3 cell cultures, and blocked its effect on MSV replication. Since ara C inhibited DNA synthesis without affecting RNA synthesis, it is concluded that MSV (a RNA virus) depends on DNA synthesis for its successful replication in 3T3 cells.

69-2081 ISOLATION AND IDENTIFICATION OF A HELPER VIRUS FOUND IN THE MOLONEY SARCOMA-LEUKEMIA VIRUS COMPLEX. (E.) Fischinger, P. J. (NCI, Bethesda, Md.), C. O. Moore and T. E. O'Connor. J. Nat. Cancer Inst. 42(4):605-622, 1969.

High titers of a helper virus were obtained from a cell subline (IC) of 3T3 cells chronically infected with the Moloney sarcoma-leukemia virus (MSV-MLV) complex. The IC line showed no overt sign of viral transformation and contained no detectable sarcoma virus. The IC cells were resistant to superinfection by Rauscher or Moloney pseudotypes of mouse sarcoma virus. Anti-MLV antisera specifically neutralized both defective MSV and the helper activity of cell-free lysates of IC. The virus could be propagated indefinitely in mouse embryo fibroblasts and could exist in a cell-free infectious state. In newborn NIH Swiss mice, i.p. inoc. of cell-free lysates or intact IC cells, induced a lymphoma syndrome essentially identical to the MLV syndrome in 2-3 mo., and cell-free extracts of spleen, lymph node and thymus tissue from these animals contained MLV in high titers. It is concluded that the helper virus from the MSV-MLV complex is true MLV.

69-2082 ULTRASTRUCTURE OF CHICK EMBRYO CELLS ALTERED BY STRAIN MC29 AVIAN LEUKOSIS VIRUS. (E.) Heine, U. (Duke U. Med. Ctr., Durham, N. C.), A. J. Langlois, J. Riman and J. W. Beard. Cancer Res. 29(2):442-458, 1969.

In primary cultures of chick embryo cells, infection with MC29 avian myelocytoma virus rapidly caused marked ultrastructural changes involving the nucleus (especially the chromatin), cytoplasm and cell membrane, which were characteristic of primitive cells with a high potential for metabolic activity and growth. These ultrastructural changes differed widely from the changes induced by other avian tumor viruses, and indicated the genome specificity of the MC29 virus.

69-2083 ORGAN CULTURES OF MOUSE MAMMARY TUMORS IN VARIOUS HORMONAL ENVIRONMENTS: AN ULTRASTRUCTURAL STUDY. (E.) Michelson, S. F. (Coll. France, Paris) and F. Haguenau. J. Nat. Cancer Inst. 42(4): 545-558, 1969.

In organ cultures of 2 mammary tumors from PS strain mice, addition of mammotropin, somatotropin and/or estradiol (singly or in combination, at various conc.) to the insulin-containing medium, had little or no effect on the ultrastructure of these tumors or on their production of mammary tumor virus.

69-2084 DETECTION BY IMMUNODIFFUSION OF MOUSE MAMMARY TUMOR VIRUS IN MILK SAMPLES AND CORRELATION WITH TUMOR DEVELOPMENT. (E.) Blair, P. B. (U. California, Berkeley). Cancer Res. 29(4):745-748, 1969.

Milk from female BALB/cfC3HCrgl mice, neonatally infected with the mammary tumor virus (MTV), was examined by immunodiffusion (using a rabbit antiserum) for MTV virion antigen. Few of the milk samples from females in the first lactation contained detectable MTV, but the incidence of positive samples increased with successive lactations. Mammary tumors were first seen in some mice after the second pregnancy and lactation; by the age of 11 mo., 28/43 mice (65%) had developed mammary tumors. No correlation was seen between the early development of mammary tumors and the presence of detectable amounts of MTV antigen in the milk of the first and second lactations, but the presence of detectable levels of MTV in later lactations was correlated with the development of a mammary tumor during the study period.

69-2085 PRELIMINARY REPORT ON VIRUS-LIKE PARTICLES IN A TRANSPLANTABLE RAT MAMMARY CARCINOMA. (E.) Engle, G. C. (U. Pennsylvania Sch. Vet. Med., New Bolton Ctr., Kennett Square), S. Shirahama and R. M. Dutcher. Cancer Res. 29(3):603-609, 1969.

Newborn Northwest Sprague-Dawley (NWSD) rats were inoc. s.c. with homogenates of an X-ray-induced transplantable rat mammary tumor. Electron microscopic examination revealed virus-like particles in subsequent tumor transplants (into 3-10-wk.-old rats), beginning 15 or more days after tumor transplantation. No virus particles were observed in the thymus, spleen or plasma at 8-30 days after tumor transplantation. The spherical virus-like particles, which resembled those of mouse, avian or cat leukemia virus, were tentatively identified as Type C particles (Bernhard's classification).

69-2086 VIRAL INHIBITION IN ADENOVIRUS 5 TREATED HAMSTER CELLS. (E.) Singer, S. H. (NIAID, Bethesda, Md.), R. L. Kirschstein and S. Baron. Proc. Soc. Exp. Biol. Med. 130(2):376-381, 1969.

In primary hamster embryo fibroblast cultures inoc. with human adenovirus type 5 (AV-5), no significant net increase in AV-5 yield and no interferon-like activity was detected in the supernatant fluid after 5 days of observation. These cells were subsequently challenged with 2 RNA viruses, vesicular stomatitis (VSV) or Semliki Forest virus, beginning 4 days after AV-5 inoc. A direct correlation was noted between the multiplicity of AV-5 infection and the degree of VSV inhibition. Since a definite inhibition also occurred after challenge with a DNA virus (herpes simplex) resistant to hamster interferon, it is concluded that the intracellular inhibition was not interferon-mediated. No significant difference between the adsorption of challenge VSV in control cells and AV-5-infected cells was noted.

69-2087 ADENOVIRUS SUSCEPTIBILITY TO INTERFERON: SENSITIVITY OF TYPES 2,7, AND 12 TO HUMAN INTERFERON. (E.) Gallagher, J. G. (U. Illinois Sch. Med., Chicago) and N. Khoobyarian. Proc. Soc. Exp. Biol. Med. 130(1):137-142, 1969.

Sensitivity of adenovirus types 2 (AV-2; non-oncogenic), 7 (AV-7; weakly oncogenic) and 12 (AV-12; strongly oncogenic) to human tissue culture interferon was determined by the plaque reduction assay, using primary and secondary human embryo fibroblast cell cultures. Significant reduction in plaque formation was noted in all cultures protected with 125 U or more of interferon (based on vesicular stomatitis virus plaque reduction). The appearance of plaques was also delayed: 4 days with AV-2 and 1 day with AV-7 and AV-12. Rabbit interferon also reduced the yield of AV-12. It is concluded that these viruses have a limited susceptibility to moderate amounts of interferon and the possibility of using it for in vitro studies on the mechanism of viral oncogenesis is discussed.

69-2088 EFFECT OF BCG AND ALLOGENEIC TUMOUR CELLS ON ADENOVIRUS TYPE 12 TUMORIGENESIS IN MICE. (E.) Sjögren, H. O. (U. Lund, Sweden) and J. Ankerst. Nature (London) 221(5183):863-864, 1969.

Newborn (12-24 hr. old) CBA mice were inoc. with adenovirus type 12 (AV-12); Huie strain). At age 4 wk., 1 group was treated with BCG; another group was inoc. at ages 1, 2, 4, and 8 wk. with cells of the AV-12-induced A12SBA mouse tumor; another group was inoc. with the Rous sarcoma virus (Schmidt-Ruppin strain)-induced RSBV mouse sarcoma at the same intervals; the fourth group was not further treated. The incidence of AV-12-induced tumors in the untreated mice was 55% (57% in females, 53% in males). Admin. of BCG reduced the incidence to 14% (25% in females, 6% in males) and retarded tumor development (no other details). Inoc. of A12SBA or RSBV tumor cells reduced the incidence to 8-10% (16% in females, 3% in males). It is concluded that the inhibitory effect of these 2 types of tumor cells did not result from specific immunization, but rather from non-specific stimulation of the immune system of the hosts (the "BCG effect") against the tumor-specific transplantation antigen of the developing tumor cells.

69-2089 ULTRASTRUCTURAL MODIFICATIONS OF THE CELL SURFACE AND INTERCELLULAR CONTACTS OF SOME TRANSFORMED CELL STRAINS. (E.) Martinez-Palomo, A. (Cancer Res. Inst., Villejuif, France), C. Braislovsky and W. Bernhard. Cancer Res. 29(4):925-937, 1969.

The cell surfaces and intercellular connections of normal, contact inhibited cultures (rat and

Chinese or Syrian hamster embryo cells) and 5 different transformed cell lines (spontaneously transformed rat fibroblasts or BHK21 hamster cells; adenovirus type 12-transformed Chinese or Syrian hamster cells; SV40-transformed Syrian hamster cells) were compared under the electron microscope. Close junctions and desmosome-like structures were as common in transformed cultures as in controls, but the "tight junctions" had almost disappeared in the transformed cultures. The ruthenium red layer was much greater in the 5 transformed strains than in the control cultures, suggesting an increase of the mucopolysaccharide deposit at the cell surface.

69-2090 EXPERIMENTAL INFECTION OF RHESUS WITH SIMIAN VIRUS 40 (SV40). (E.) Shah, K. V. (Johns Hopkins U., Baltimore, Md.), S. Willard, R. E. Myers, D. M. Hess and R. DiGiacomo. Proc. Soc. Exp. Biol. Med. 130(1): 196-203, 1969.

Intranasal, intragastric or s.c. admin. of Strain A 2895 of SV40 readily caused symptomless infections in non-immune juvenile rhesus monkeys (1-2 yr. old), as shown by the development of viremia, neutralizing and complement-fixing antibodies, and tumor (T) antigens. Viruria was noted only after s.c. inoc. of SV40, but some animals admin. SV40 by the other routes later developed urinary SV40-neutralizing activity. SV40 was isolated from the kidney of 1 animal, 29-31 wk. after infection. Intracerebral or s.c. inoc. of SV40 during gestation (at about day 90) led to the formation of high antibody titers in 3/3 animals; the 1 surviving monkey showed persistently high antibody titers during the first 11 wk. of life. None of the SV40-inoc. monkeys developed tumors.

69-2091 A RAPID IN VIVO ASSAY FOR SV40 TUMOR IMMUNITY IN HAMSTERS. (E.) Coggin, J. H., Jr. (U. Tennessee, Knoxville) and K. R. Ambrose. Proc. Soc. Exp. Biol. Med. 130(1): 246-252, 1969.

Syrian golden hamsters (4-7 wk. old), immunized by 2-3 inj. (i.p.) of either irradiated cells from the SV40-induced F5-1 tumor, or with SV40 virus itself showed a diffusible, non-cellular factor in the peritoneal cavity, which destroyed or inhibited the proliferation of homologous SV40 tumor cells contained in diffusion chambers (implanted 10-14 days after the last immunization). The activity of this factor, determined by removing the chambers 5-6 days after implantation, was stronger in hamsters receiving 3 inj. than those immunized by 2 inj., and was somewhat dependent on the target cell conc. (optimal, 50,000 cells/chamber). It had no activity against muscle cells from homologous hamsters. The environment of the chamber was free from lymphoid cell penetration. After removal of the chambers, hamsters immunized by F5-1 cells or SV40 proved to be uniformly immune when challenged with a conc. of tumor cells which produced tumors at the inoc. site in 90-100% of non-immune hamsters. It is suggested that the inhibitory factor is humoral antibody.

69-2092 THE EFFECT OF PHLEOMYCIN ON THE REPLICATION OF PAPOVAVIRUS SV40 AND OTHER DNA VIRUSES IN SIMIAN CELLS. (E.) Tevethia, S. S. (Baylor U. Sch. Med., Houston, Tex.) and F. Rapp. Cancer Res. 29(4):912-917, 1969.

In primary GMK cell cultures, the copper-containing Streptomyces verticillus antibiotic phleomycin blocked the synthesis of infectious SV40; max. inhibition was seen during the peak period of viral DNA synthesis (12-30 hr. after SV40 inoc.). Synthesis of SV40 viral antigen was also markedly reduced. Phleomycin inhibited vaccinia virus multiplication, but was less effective against viruses of the herpes group. Phleomycin moderately inhibited synthesis of SV15 (a simian adenovirus). The effect of phleomycin apparently depended on the adenine and thymine content of the viral DNA. Phleomycin had no effect on the replication of an RNA virus (poliovirus) in culture.

69-2093 NECESSITY FOR PURINE PRECURSORS FOR THE EXPRESSION OF A TRANSFORMATION CHARACTERISTIC IN BHK 21/13 CELLS. (Fr.) Montagnier, L. (Fac. Sci., Orsay, France). C.R. Acad. Sci. [D] (Paris) 268(17):2218-2221, 1969.

In BHK 21/13 clones, transformed spontaneously or by viruses (polyoma virus, or the Schmidt-Ruppin or Bryan strains of Rous sarcoma viruses), the factors required for growth in the presence of certain acid polysaccharides were identified as purine nucleotides or their derivatives. Adenosine monophosphate and its precursors were the most active compounds in this respect.

69-2094 UNEXPECTED HIGH INCIDENCE OF TUMOURS IN THYMECTOMIZED MICE TREATED WITH ANTI-LYMPHOCYTIC GLOBULIN AND Mycobacterium leprae. (E.) Gaugas, J. M. (Imp. Cancer Res. Fund, London), F. C. Chesterman, M. S. Hirsch, R. J. W. Rees, J. J. Harvey and C. Gilchrist. Nature (London) 221(5185):1033-1036, 1969.

In an attempt to transmit human leprosy, thymectomized adult female CBA mice were inoc. with Mycobacterium leprae, followed by immunosuppressive treatment with anti-lymphocyte globulin (ALS [IgG]) of rabbit origin. All mice developed a variety of tumors, 22-40 wk. after ALS(IgG) admin. was begun. Polyoma virus (PV) was present in many of these tumors; transmission of PV by ALS(IgG) could not be excluded, but the source of the PV could not be determined (the stock mice were free of PV). It is suggested that thymectomy combined with ALS(IgG) admin. activated PV and possibly other tumor viruses (mammary tumor agent or the FBJ virus).

69-2095 INHIBITION OF THE GROWTH OF MOUSE POLYOMA TUMORS BY LYMPH NODE FRAGMENTS FROM SPECIFICALLY IMMUNIZED RATS. (E.) Jeejeebhoy, H. F. (McGill U., Montreal, Canada) and A. G. Rabbat. Cancer Res. 29(5):1103-1110, 1969.

Male C57BL/6J mice were inoc. s.c. with cells from a transplantable mouse polyoma virus (PV)-induced tumor (transplant generations 64-70). On the same day, rats were immunized with fragments of either the PV tumor, normal mouse tissue, or the antigenically unrelated BW 10232 tumor; 7 days later, lymph node fragments from these immunized rats were implanted i.p. (either directly or in Millipore diffusion chambers) into the tumor-bearing mice. After 7 days, the mortality rate was approx. 50% in mice with specific or non-specific immune rat lymph node fragments implanted directly; in mice bearing lymph node fragments contained in diffusion chambers, the mortality rate was negligible. The growth of the PV tumors was significantly less in mice inoc. with specific immune lymph node fragments (in diffusion chambers or not) than in controls. Tumor growth was unaffected or even accelerated in mice inoc. with lymph node fragments from rats immunized with the BW 10232 tumor or normal mouse tissue. It is concluded that inhibition of mouse PV tumors by lymphoid cells from specifically immunized rats results at least in part from some diffusible, specific humoral agent(s).

69-2096 "INDUCTION" OF VIRAL ANTIGEN IN ESTABLISHED CELL LINE (SP-8) DERIVED FROM SHOPE VIRUS-INDUCED CUTANEOUS PAPILLOMA OF RABBITS. (E.) Shiratori, O. (Aichi Cancer Ctr., Nagoya, Japan), T. Osato and Y. Ito. Proc. Soc. Exp. Biol. Med. 130(1):115-121, 1969.

Intranuclear synthesis of Shope papilloma virus (SPV) antigen was demonstrated by immunofluorescence in the SP-8 cell line (from SPV-induced papilloma of rabbits) for up to 4 transfer generation, but not in subsequent generations maintained at 37° C. When cultures of SP-8 cells which had lost the SPV antigen were incubated at 30° C, the SPV antigen reappeared after about 1 wk. at the lower temperature. The specific fluorescence first appeared in the perinuclear area of the cytoplasm; after 13 days (when a max. of 80% of the cells showed the antigen), fluorescence was distributed diffusely in the cytoplasm. No intranuclear fluorescence was noted. Cottontail rabbit kidney (CRK) cell cultures could be infected by cell-free extracts from these SP-8 cells after 2 wk. of maintenance at 30° C; specific (intracytoplasmic) immunofluorescence first appeared in the CRK cells 8 days after inoc. It is suggested that the complete SPV genome persists in SP-8 cells, and that the lower temperature provides favorable conditions for its expression.

69-2097 ANTITUMOR IMMUNITY IN THE SHOPE PAPILLOMA-CARCINOMA COMPLEX. IV. SEARCH FOR A TRANSMISSIBLE FACTOR INCREASING THE FREQUENCY OF TUMOR REGRESSION. (E.) Evans, C. A. (U. Washington Sch. Med., Seattle) and J. J. Thomsen. J. Nat. Cancer Inst. 42(3): 477-484, 1969.

Rabbit kidney vacuolating virus, and fresh pooled blood, nasal washings and fecal suspensions from rabbits (of a strain showing a high incidence of papilloma regression) with regressed Shope papilloma virus (SPV)-induced tumors, were inoc. into rabbits of a low-tumor regression Strain (San Juan), 28-49 days before SPV inoc. In the pretreated animals, the tumors regressed in 10/50 after 8 wk. and in 18/50 after 11 wk., compared to 4/47 and 4/46, resp., in untreated controls. The tumors also tended to be smaller in pretreated animals. San Juan rabbits reared in close association with New Zealand White rabbits (which have a high frequency of spontaneous tumor regression) also showed a higher tumor regression frequency (30% complete and 10% partial tumor regressions after 11 wk.) and smaller tumors than San Juan rabbits kept in isolation (no complete and 18% partial tumor regressions). It is suggested that some component of the indigenous microbial or viral flora of some rabbitry-raised animals can inhibit the growth and increase the regression frequency of SPV papillomas.

69-2098 THE SUSCEPTIBILITY OF FETAL RAT SKIN IN DIFFERENT IMMUNOLOGIC ENVIRONMENTS TO NEOPLASTIC INDUCTION WITH SHOPE PAPILLOMA VIRUS. (E.) Kreider, J. W. (Pennsylvania State U. Sch. Med., Hershey) and C. Breedis. Cancer Res. 29(5):989-993, 1969.

Shope papilloma virus (SPV)-infected skin from fetal Lewis rats showed papillomatous changes in 6/8 cheek pouch implants in cortisone-treated young adult Syrian golden hamsters. In syngeneic hosts (10-12-wk.-old Lewis rats), however, SPV-infected fetal skin underwent papillomatous changes in only 26/191 grafts (7.3%). These papillomas were small and regressed after a short time; regression was always preceded and accompanied by lymphocytic infiltration. It is suggested that the rats were able to recognize a new antigen in the SPV-transformed syngeneic epidermal cells, and to reject the resulting papilloma cells.

69-2099 GENITAL HERPETIC INFECTION. ASSOCIATION WITH CERVICAL DYSPLASIA AND CARCINOMA. (E.) Naib, Z. M. (Emory U. Sch. Med., Atlanta, Ga.), A. J. Nahmias, W. E. Josey and J. H. Kramer. Cancer 23(4):940-945, 1969.

From January, 1962-June, 1968, 56,418 female subjects were screened at 1 Atlanta hospital. Genital herpes virus infections (GHVI) were seen in 245 pts. (0.43%; aged 7-76 yr.). Both groups were about 80% Negro. In the total group, the pts. with GHVI, and 245 age- and race-matched controls without GHVI, biopsy examinations (performed in 11.9%, 40.0% and 3.2%, resp.) disclosed cervical anaplasia of various forms in 2.7%, 23.7% and 1.6%, resp. These anaplastic lesions comprised squamous atypia in 1.9%, 17.1% and 1.2%, resp., carcinoma in situ in 0.4%, 4.9% and 0.4%, resp., and invasive carcinoma in 0.4%, 1.6% and 0.0%, resp. Peak ages at the diagnosis of GHVI, dysplasia, carcinoma in situ and invasive carcinoma were 20, 25, 31 and 48 yr., resp. It is suggested that either similar factors operate independently to cause both GHVI and malignant or premalignant lesions of the cervix, or that the venereally-transmitted Type 2 GHVI has an etiologic role in cancer of the cervix. Close follow-up examinations of women with GHVI are recommended.

69-2100 ELECTRON MICROSCOPIC STUDIES OF SUSPENSION CULTURES DERIVED FROM HUMAN LEUKEMIC AND NONLEUKEMIC SOURCES. (E.) Recher, L. (U. Texas M.D. Anderson Hosp., Houston), J. G. Sinkovics, J. A. Sykes and J. Whitescarver. Cancer Res. 29(2):271-285, 1969.

Suspension cultures of bone marrow, spleen, lymph node or peripheral blood cells from 7 pts. with Hodgkin's disease (2), lymphosarcoma (2), carcinoma of the cervix with idiopathic thrombocytopenic purpura (1), myeloproliferative disease (1) or myelomonocytic leukemia (1) were established. Despite their different origins and the variety of clinical diagnoses, these cell lines resembled each other, and also resembled the lymphoblastic cell lines derived from the Burkitt lymphoma. Cells from 5/7 pts. showed herpes-type virus particles; the negative cell lines were obtained from the pt. with myelomonocytic leukemia and from 1/2 with lymphosarcoma.

69-2101 THE EFFECT OF MUMPS VIRUS ON THE RESISTANCE OF BURKITT LYMPHOMA CELL LINES TO VARIOUS VIRUSES. (E.) Zajac, B. A. (U. Pennsylvania Sch. Med., Philadelphia), W. Henle and G. Henle. Cancer Res. 29(2): 481-488, 1969.

Persistent mumps virus (MV) infections were readily established in 4/4 cell lines derived from the Burkitt lymphoma (EB-1, EB-3, Raji and Ogun) and 2/2 cell lines derived from pts. with leukemia (SK-L1 and RPMI 6410). MV superinfection (which reduced cellular growth rates by no more than 50%) increased the susceptibility of some of the cell lines to certain unrelated viruses, but did not affect the Epstein-Barr virus (EBV) carrier state. MV superinfection prevented the protective action of exogenous human interferon (If), but did not reduce the synthesis of autogenous If (present in EB-1, Ogun and SK-L1 cells) or of reovirus type 3-induced If. Efforts to transmit EBV from MV-free stock cultures or from MV-containing cultures of these cells were unsuccessful.

69-2102 EFFECT OF HERPES SIMPLEX VIRUS ON CULTURED BURKITT TUMOR CELLS AND ITS FAILURE TO INFLUENCE THE EPSTEIN-BARR VIRUS CARRIER STATE. (E.) Henle, W. (U. Pennsylvania Sch. Med., Philadelphia), G. Henle and H. Zur Hausen. Cancer Res. 29(2):489-495, 1969.

In 8 cell lines derived from the Burkitt lymphoma (EB-1, EB-2, EB-3, EB-4, Raji, Kudi, Jijoye and Ogun) and 6 cell lines from pts. with leukemia (SK-L1, SK-L2, RMPI-4265, LK-1D, LK-57 and LK-60), the sensitivity to herpes simplex virus (HSV) infection varied widely from 1 cell line to another, for unexplained reasons. HSV susceptibility or resistance was not related to the extent of indigenous infection with the Epstein-Barr virus (EBV), the production of autogenous interferon or other antiviral substances, or the degrees of HSV adsorption. HSV superinfection did not affect the EBV carrier state. No EBV antigen was detectable in human or rabbit cell populations exposed to viral progeny from HSV-infected cultures (either untreated or treated with HSV antiserum).

69-2103 RESULTS OF A COMPARISON OF SEROLOGIC TESTS USED TO DETECT HUMAN ANTIBODIES TO A HERPESVIRUS (HLV) ASSOCIATED WITH BURKITT'S LYMPHOMA. (E.) (NCI, Bethesda, Md.). J. Nat. Cancer Inst. 42(4):623-631, 1969.

Antibody titers against the herpes-like virus (HLV) of Burkitt's lymphoma (BL) were studied in 133 sera, from 14 African pts. with BL (most were children under 14), 49 American pts. with leukemia, and 2 groups of control subjects matched by age, sex and geographical area. Reference standards were 2 BL cell lines (the HLV-positive Jijoye and HLV-negative Raji lines), 1 HLV-positive leukemic cell line (F-152), and 1 HLV-negative normal cell line (N-37). Three quantitative tests (indirect immunofluorescence, complement fixation and antibody coating reaction) and 1 qualitative test (Ouchterlony immunodiffusion) proved specific for HLV; the other 3 tests (cytotoxicity, mixed hemadsorption and indirect membrane immunofluorescence) were not related to the presence or absence of HLV or to the malignancy of the preparations studied. The 3 HSV-specific quantitative tests showed significantly higher mean antibody titers in the

era of the African pts. with BL (who also
howed high reactivity to herpes simplex virus)
han in the control sera. In the American group,
/3 specific quantitative tests (the exception
as the antibody coating test) showed higher
ean antibody titers in the leukemic sera than
n the control sera, but this difference was not
ignificant, considering the size of the pt. and
ontrol groups.

9-2104 IMMUNO-GEL DIFFUSION STUDIES WITH THE
HERPES TYPE VIRUS (HTV) ASSOCIATED WITH
URKITT'S LYMPHOMA. (E.) Konn, M. (Hirosaki U.
ch. Med., Japan), D. S. Yohn, Y. Hinuma,
. Yamaguchi and J. T. Grace, Jr. Cancer 23(4):
90-997, 1969.

abbit antisera to herpes-type virus (HTV) pro-
uced 3 HTV-specific precipitin lines (designated
a," "b" and "c") in gel immunodiffusion (ID)
nd indirect immunofluorescence (IF) tests, using
he HTV-positive HR1-K subline of P3-J Burkitt's
ymphoma cells. Absorption with HR1-K cells
emoved all precipitin lines, but absorption with
aji cells (HTV-free) did not. The "c" line
ontained antibody-coated intact virions; lines
a" and "b" were identical to those obtained with
uman antisera. The ID and IF tests were per-
ormed on sera from 475 adults: 83 healthy sub-
ects, 156 with various non-malignant diseases
nd 236 with Hodgkin's disease (64), lymphosar-
oma, (49) leukemia, (39) reticulum cell
arcoma (42), carcinoma (40) or melanoma (2).
ositive ID reactions were seen in 79/475; IF
iters of 1:100 or more were seen in 78/79 ID-
ositive sera. Results of the IF test were
ositive in 96-99% of the sera from each group
f subjects, the ID test revealed a higher
ncidence (28%) of precipitating antibodies in
era from pts. with cancer than in sera from
ts. with other diseases (7%) or normal adults
4%). Of 21 selected ID-positive sera, all
howed "a" precipitin lines; "b" lines were
een in 8 (3 Burkitt lymphoma, 3 lymphosarcoma,
chronic lymphatic leukemia) and a "c" line in
(Burkitt lymphoma and chronic lymphatic
eukemia). It is suggested that positive IF
iters of 1:400-1:500 will yield positive ID
eactions in 70% of cancer pts. and IF titers of
ore than 1:500 in 95% of the pts.

9-2105 DIRECT MEMBRANE IMMUNOFLUORESCENCE
REACTION OF BURKITT'S LYMPHOMA CELLS
N CULTURE. (E.) Goldstein, G. (U. Virginia,
harlottesville), G. Klein, G. Pearson and P.
lifford. Cancer Res. 29(4):749-752, 1969.

he direct membrane immunofluorescence method
as used to detect membrane antigen(s) for the
erpes-type EB virus of Burkitt's lymphoma (BL).
he fluorescent γ-globulins containing the
eactive antibodies were obtained from the Mutua
ntiserum (from a pt. with BL), which contains
o detectable isoantibodies. Unlabeled sera
from all pts. with BL strongly inhibited membrane staining; the minimum "blocking index" was 0.53, and in 14/21 preparations it was over 0.8. The only other serum with strong activity (a blocking index of 0.95) was obtained from 1/2 pts. with carcinoma of the postnasal space. Sera from several other pts. with other diseases (including carcinoma of the postnasal space or maxilla, embryonal sarcoma or plasmacytoma, and 3 isoantisera from multiply transfused persons) had little or no effect.

69-2106 LYMPHOBLASTOID TRANSFORMATION AND PRESENCE OF HERPES-TYPE VIRAL PARTICLES IN A CHINESE NASOPHARYNGEAL TUMOUR CULTURED IN VITRO. (E.) De-Thé, G. (Int. Ctr. Cancer Res., Paris), J. C. Ambrosioni, H. C. Ho and H. C. Kwan. Nature (London) 221(5182):770-771, 1969.

Of 32 biopsy specimens from nasopharyngeal tumors (obtained in Hong Kong), 15 grew in tissue culture; 1/15 (designated 68/866/7) showed transformation of the fibroblastic elements into a free-floating population of mixed plasma cells and lymphoblastoid cells (after 42 days of culture). The free-floating cells grew rapidly when transferred onto fibroblasts from the same tumor. Some of the degenerating cells contained herpes-type virus (HTV) particles, resembling the HTV particles seen in cultures from Burkitt's lymphoma (BL). Moderate to high antibody titers against BL cell surface antigens and against the HTV were detected in the sera of the pts. who provided the cell cultures.

69-2107 ASSOCIATION OF EB-VIRUS INFECTION WITH THE POST-PERFUSION SYNDROME. (E.) Gerber, P. (NIH, Bethesda, Md.), J. H. Walsh, E. N. Rosenblum and R. H. Purcell. Lancet 1(7595):593-596, 1969.

Patterns of complement-fixing antibodies to herpes simplex virus, cytomegalovirus and the herpes-type EB virus (EBV) were studied in 2 children and 3 adults undergoing open-heart surgery with cardiopulmonary bypass. None showed detectable EBV antibodies before surgery, but 4/5 showed EBV antibodies during the postoperative period; antibody titers persisted at max. levels 27-50 wk. after surgery. Two pts. remained symptom-free, 1 became febrile, and 1 developed a syndrome resembling infectious mononucleosis. The fifth pt. showed a transient increase in EBV antibody levels during the postoperative period; the pattern of complement-fixing antibodies in this pt. suggested a passive transfer of immunity.

69-2108 XENOTRANSPLANTATION OF A BURKITT LYMPHOMA CULTURE LINE WITH SURFACE IMMUNOGLOBULIN SPECIFICITY. (E.) Levin, A. G. (Karolinska Inst., Stockholm), S. Friberg, Jr.

and E. Klein. Nature (London) 222(5197): 997-998, 1969.

Cells from a pt. with Burkitt's lymphoma (BL) were inoc. i.v. into 28 newborn Fisher rats. One animal from a neonatally thymectomized litter died with multiple tumors (kidneys, 1 adrenal, lungs, lymph nodes, brain) 17 days later; 1 of the non-thymectomized rats died with similar tumors 21 days after inoc. In both animals, the tumors had the histological characteristics of BL. In a test for the presence of cell membrane-bound immunoglobulin, the rat tumor cells reacted with anti-human IgM and kappa serum, but not with anti-human IgA or lambda serum. Serum from the tumor-bearing rats contained no human IgM molecule which would bind anti-IgM antibodies. No evidence of human serum proteins or of anti-human antibodies was found in the rat serum. It is suggested that the accumulation of immunoglobulin in the cell membrane may be a consequence of a defect in the secretory mechanism, or that this BL cell may represent a malignant growth from a clone of naturally occurring lymphocytes with this property.

69-2109 IMMUNIZATION AGAINST MAREK'S DISEASE USING A LIVE ATTENUATED VIRUS. (E.) Churchill, A. E. (Houghton Poultry Res. Stat., England), L. N. Payne and R. C. Chubb. Nature (London) 221(5182):744-747, 1969.

Significant protection against i.p. or contact challenge with virulent Marek's disease (MD) herpes-type virus (HTV) was seen in HPRS-RIB chicks inoc. i.p. with attenuated HTV (31-39 passage). In chicks vaccinated when 1 day old, and challenged at age 46 days by i.p. admin. of HTV ($10^{3.1}$ PFU/chick), 1/15 died of MD; MD mortality in controls was 10/18. When 2-wk.-old chicks were vaccinated (i.p.) and placed in contact with infected birds, the mortality from MD at age 24 wk. was 0/16, compared to 8/14 in unvaccinated chicks. Another experiment showed that in unvaccinated birds MD mortality caused by contact challenge was lower and lagged about 3 wk. behind the mortality caused by i.p. challenge. Vaccinated chicks developed precipitating antibodies against the B and C antigens of HTV, but not the A antigen, suggesting that this antigen was lost during attenuation. However, i.p. challenge of vaccinated birds with virulent HTV resulted in a higher incidence of precipitating antibodies against all 3 antigens than in unvaccinated, challenged chicks, indicating that vaccination, although providing protection against development of MD, did not prevent subsequent infection with virulent HTV. This was confirmed by repeat HTV isolation from blood (14 days after vaccination), which also showed that attenuated HTV did not revert to the original type.

69-2110 HERPESVIRUS IN MAREK'S DISEASE TUMORS. (E.) Schidlovsky, G. (Chas. Pfizer Co., Inc., Maywood, N. J.), M. Ahmed and K. E. Jensen. Science 164(3882):959-961, 1969.

Several 2-day old Athens-Canadian chicks were exposed for 6 days to chicks carrying Marek's disease, then kept in isolation and sacrificed at 1-wk. intervals for gross and electron microscopic examination. Chicks kept in isolation for 4 wk. showed massive enlargement of the kidneys, resulting from infiltration with lymphoid cells. The epithelial cells lining the collecting tubules of the kidney contained intranuclear and intracytoplasmic herpes-type virus (HTV) particles, but none were seen in the lymphoid tumor cells invading the kidneys. The epithelial and interstitial cells grew in monolayer cultures; within 6 days they showed CPE, consisting of refractile rounded cells which contained HTV. Similar CPE and HTV were also noted in chick embryo fibroblast cultures inoc. with HTV. Time-lapse photography of infected cells showed a lytic and not a proliferative response to HTV infection.

69-2111 "VIRUS-FREE" RENAL TUMORS OBTAINED FROM PREHIBERNATING LEOPARD FROGS OF KNOWN GEOGRAPHIC ORIGIN. (E.) Zambernard, J. (U. Colorado Med. Ctr., Denver) and R. G. McKinnell. Cancer Res. 29(3):653-657, 1969.

Among 550 Rana pipiens collected in mid-August 1967 in Otter Tail County (west-central Minnesota), 2 renal adenocarcinomas were detected (incidence 0.36%); among 150 frogs collected in mid-October 1967 in Kandiyohi County (central Minnesota), 9 renal adenocarcinomas (incidence 6.0%) were detected. Five tumors were found in adult males and 6 in adult females. No virus particles were detected by light and electron microscopic examination in any of the 11 tumors from these prehibernating frogs. Since intranuclear, intracytoplasmic and extracellular virus particles were found in 11 renal tumors from posthibernating frogs collected in the early spring of 1967 (previously reported), it is concluded that the presence or absence of virus particles in renal tumors of frogs is climatologically determined.

See also abstract nos.: 1992,1993,1994,1995,1996,2001,2146,2184

69-2112 THE GEOGRAPHICAL DISTRIBUTION OF CANCER. (E.) Doll, R. (U. Coll. Hosp. Sch. Med., London). Brit. J. Cancer 23(1):1-8, 1969.

Age-standardized av. annual incidence rates/100,000 for 13 primary tumors in males (leukemia and cancer of the mouth, nasopharynx, esophagus, stomach, colon, rectum, pancreas, larynx, lung, prostate, bladder and thyroid) and 2 primary cancers in women (breast and cervix) in 48 nations and many population groups are tabulated. These incidence rates are given for the 35-64 yr. age group and usually for the period 1960-1962. One table provides conversion factors used to calculate the incidence rates for 10 cancers (at age 35-64) from the mortality rates for the same cancers at ages 35-64 and 30-54. Two other tables show the variation in cervix cancer incidence among ethnic groups (New York City; females aged 35-64) and the geographical variations in the incidence of primary cancer of the esophagus (males aged 35-64) and liver (males aged 15-44).

69-2113 A DEMOGRAPHIC VIEW ON THE OCCURRENCE OF MALIGNANT NEOPLASM IN THE POPULATION. (E.) Wunder, R. (Oncol. Res. Inst., Bratislava, Czechoslovakia). Neoplasma (Bratisl.) 15(5):485-500, 1968.

Several patterns of intersecting curves were seen when time changes in cancer occurrence in several nations were plotted. Cancer mortality rates in males had passed the rates in females by 1964 in 29 industrialized nations (the curves intersected between 1955 and 1964 in at least 7 cases), and the curves were approaching each other in Israel and 4 developing Latin-American nations. In 19 nations, mortality rates for g.i. cancer (excluding liver cancer) from 1949-1963 showed patterns resembling all phases of a normal distribution curve: increasing rates in Japan and 4 developing nations; high, stationary or slightly decreasing rates in 5 industrialized nations; rapidly decreasing rates in 6 industrialized nations; and low, slowly decreasing rates in 3 industrialized nations (including the U.S.). Intestinal cancer became more important as stomach cancer mortality decreased (first in females, later in males). Mortality rates from breast and genital cancer (females) from 1901-1962 showed intersecting curves in 7/7 nations; the curves were approaching each other in the U.S., and breast cancer had become more important than genital cancer by 1962 in the other 6 nations. As of about 1962, breast cancer had become the most prevalent cause of death from cancer in women in 18/40 industrialized nations, and the prevalence was increasing in the other nations. The reduced mortality from cancer of the uterus is usually attributed to improved prevention and treatment methods, but the morbidity rates for cancer of the uterus may already have peaked (or will soon reach their peaks), at least in the industrialized nations.

69-2114 DEVELOPMENT OF CANCER MORBIDITY AND MORTALITY IN CZECHOSLOVAKIA. (E.) Vǎdura, F. (Oncol. Inst., Prague). Neoplasma (Bratisl.) 15(5):475-484, 1968.

The recent increase in the over-all cancer mortality rate in Czechoslovakia (from about 129/100,000 in 1945 to 210.5 in 1966) was attributed to an extension of the av. life span. The increase in the number of new cases of bronchogenic carcinoma was higher than expected in males (2496 cases in 1958, 4465 cases in 1965), but not in females (408 and 479 cases, resp.). The male:female ratio in pts. with bronchogenic carcinoma increased from about 4:1 in 1950 to 10:1 in 1965. Smoking and air pollution could account only partly for the increase in bronchogenic carcinoma in males, since the exposure to both factors has greatly increased in females. In males, stomach cancer was reported more often than lung cancer in 1958 (2746 and 2496 new cases, resp.), but lung cancer was reported more often than stomach cancer in 1965 (4465 and 3100 new cases, resp.). The age distribution of stomach cancer diagnosis in males remained unchanged from 1957-1962 (inclusive). In females, cancer of the cervix uteri was reported more often than breast cancer in 1958 (2335 and 2034 new cases, resp.), but breast cancer was reported more often than cervix cancer in 1965 (2348 and 1971 new cases, resp.). From 1957-1962 (inclusive), the peak age of breast cancer diagnosis shifted to an older group (from 45-49 to 60-64 yr.); for cervix cancer, the peak at 45-49 yr. remained, but a second peak appeared at age 35-39 yr.

69-2115 RESEARCH METHOD OF MALIGNANT NEOPLASIA EPIDEMIOLOGY IN SOCIALIST REPUBLIC ROMANIA. (E.) Georgescu, D. C. (Oncol. Inst., Bucharest). Neoplasma (Bratisl.) 15(5):523-541, 1968.

To obtain valid data on cancer epidemiology in small or medium-sized nations, compulsory registration of all cancer cases is necessary. A registration system of this type is now being used in Romania; the forms sent to the central cancer registry are presented (in English translation).

69-2116 CANCER INCIDENCE IN THE GERMAN DEMOCRATIC REPUBLIC. SELECTED TABLES. (E.) Herold, H. J. (Cancer Res. Inst., German Acad. Sci., Berlin) and H. Berndt. Neoplasma (Bratisl.) 15(5):517-522, 1968.

The annual incidence rates/100,000 of all tumors combined in East Germany rose from 282.2 (males) and 285.7 (females) in 1960, to 320.0 and 313.6, resp., in 1965. Tables showing the incidence rates of all tumors combined in each age group, and the incidence rates of certain tumors according to sex and region, are presented. These tables show the rates in 1960 and 1965; the data are not age-adjusted.

69-2117 SPREADING OF MALIGNANT NEOPLASMS IN THE PEOPLE'S REPUBLIC OF BULGARIA. (E.) Anchev, N. (Oncol. Res. Inst., Sofia), I. Popov, N. Monov and N. Ouzounov. Neoplasma (Bratisl.) 15(5):451-468, 1968.

The annual incidence/100,000 population of all tumors combined in Bulgaria (1965-1966) was 196.98 in males and 171.10 in females. Age-adjusted incidence rates/100,000 were higher in urban areas than in rural areas (202.09 and 173.27, resp.), but this difference was seen only in males. Cancers of the lung, stomach and skin (excluding melanoma) were the most prevalent tumors in males (in decreasing order); in females, the most prevalent tumors were cancer of the skin (excluding melanoma), breast, stomach and cervix uteri (in decreasing order). Incidence rates for skin cancer (excluding melanoma; 18.5% of all tumors), melanoma of the skin and cancer of the lip were higher in females than in males, and higher in rural areas than in urban areas; these differences were attributed to differences in sun and wind exposure. Geographical variations in the stomach cancer incidence (17.79% of all tumors) were attributed to variations in dietary habits and soil composition. Lung cancer (the third most prevalent tumor) was generally more frequent in urban areas than in rural areas; this difference was attributed to the effects of smoking and air pollution. Cancers of the breast, cervix uteri and corpus uteri in females were more prevalent in urban areas than in rural areas; cervix cancer was less prevalent in the predominantly Moslem regions of Bulgaria than in the other regions. Leukemia was more prevalent in males than in females at all ages.

69-2118 GEOCHEMICAL ASPECTS OF THE EPIDEMIOLOGY OF MALIGNANCIES. (E.) Dvoyrin, V. V. (Div. Epidemiol. Malig. Tum., Moscow). Neoplasma (Bratisl.) 15(5):559-564, 1968.

The possible significance of trace elements in the soil, water and food to the occurrence of certain tumors is discussed.

69-2119 ORGANIZATION OF STUDIES OF THE EPIDEMIOLOGY OF MALIGNANT TUMORS. (E.) Chaklin, A. V. (Inst. Exp. Clin. Oncol., Acad. Med. Sci. USSR, Moscow). Neoplasma (Bratisl.) 15(5):549-558, 1968.

Regional variations in the frequencies of cancer of the skin, oral cavity, esophagus, stomach, liver, lung, breast and cervix uteri in the USSR are discussed.

69-2120 A METHOD FOR STUDYING MORBIDITY FROM PRECANCEROUS CONDITIONS AND THE QUESTION AS TO FREQUENCY OF THEIR OCCURRENCE ON THE TERRITORY OF THE KIRGHIZ SOVIET SOCIALIST REPUBLIC. (E.) Sayenko, A. J. (Kirghiz Sci. Res. Inst. Oncol. Radiol., Frunze, USSR). Neoplasma (Bratisl.) 15(5):565-571, 1968.

Several studies of the epidemiology of premalignant diseases (PMD) in the mountainous, thinly populated Kirghiz SSR were begun in 1960 (some studies lasted up to 8 yr.). The av. detection rate for all PMD was 112/1000 persons examined, compared to 8.6-12.1/1000 for the entire USSR. In 1 study, the av. detection rate for PMD of the breast was 70/1000 women examined; another study showed a marked difference between Russian, Kirghiz and Uzbek women (av. detection rates of 94.0, 36.0 and 34.0/1000 women, resp.). The Russian women also showed a much higher frequency of dyshormonal diseases of the breast than the Kirghiz women. Av. detection rates for PMD of the cervix uteri in Kirghiz, Uzbek and Russian women were 101.2, 85.3 and 65.0/1000 women, resp., (total, 75.3/1000). PMD of the cervix uteri were more frequent in women employed in tobacco cultivation than in women employed in cotton cultivation (av. detection rates of 113.5 and 50.9/1000, resp.); they were also more frequent in rural areas than in urban areas, the highest rate occurring in the Tyan-Shan region of high alpine pastureland. The av. detection rate of PMD of the skin was 24.5/1000; it was lower in the indigenous population than in immigrants to this region. The av. detection rate of PMD of the stomach was 35.9/1000 (over 90% showed gastritis); several regional and ethnic variations were noted, but are not explained in this paper.

69-2121 A MALE-FEMALE DIFFERENTIAL IN TUMOUR INCIDENCE. (E.) Ashley, D. J. B. (Morriston Hosp., Swansea, Wales). Brit. J. Cancer 23(1):21-25, 1969.

Age-adjusted cancer incidence and death rates in England + Wales and in several other populations (especially those with white populations of predominantly Western European stock) were generally lower in females than in males; when incidence rates for malignant diseases excluding lung, breast and genital cancer were compared, a female deficit was seen in 25/25 populations. Sex differences in exposure to environmental carcinogens (such as cigarette smoke and aniline compounds), body size (which implies the number of cells available for malignant transformation), or sex hormone metabolism might account for part of this female deficit in cancer incidence. However, these factors would not explain the sex difference seen in children; death rates from tumors other than lung, breast or genital cancer in England + Wales (1958-1963) were lower in females than in males at all ages, including 0-5 yr. It is suggested that the presence of a paired X chromosome enhances the immunological capacity in females, resulting in a greater capacity for the rejection of incipient neoplastic cells.

69-2122 SEX DIFFERENCES IN THE INCIDENCE OF TUMOURS AT VARIOUS SITES. (E.) Ashley, D. J. B. (Morriston Hosp., Swansea, Wales). Brit. J. Cancer 23(1):26-30, 1969.

Data from 3 sources (5 continents; England + Wales 1958-1963; 10 U.S. metropolitan areas) were used to study the age-adjusted frequencies of 34 cancers (excluding cancers of the reproductive organs) in males and females. The female:male ratio (5 continents) for all tumors was 0.88:1. With the exceptions of malignant melanoma, thyroid cancer and cancer of the colon, the tumors listed were more prevalent in males than in females. The cyclic hormonal activity of the female might affect the incidence of thyroid cancer (the 5-continent female:male ratio was 2.33:1, compared to 16.5:1 in the U.S. non-white group) and malignant melanoma (5-continent female:male ratio of 1.20:1). The discrepancy seen between cancer of the colon and cancer of the rectum (5-continent female:male ratios of 1.04:1 and 0.67:1, resp.) was not explained. The male preponderance for lung, lip, larynx and bladder cancer was attributed to environmental factors (smoking, occupational carcinogen exposure). Except for cancer of the reproductive organs, the data suggested that females have 40-70% the chance of developing cancer as males. The possibility that females might have a greater immunologic potential because of the presence of the paired X chromosome (which carries at least 1 gene concerned with immunoglobulin production) is discussed.

69-2123 FRENCH INVESTIGATION OF CANCER MORBIDITY IN RELATION TO CERTAIN ETIOLOGIC FACTORS: ALCOHOLISM AND ATMOSPHERIC POLLUTION. (Fr.) Lasserre, O. (Nat. Inst. Health Med. Res., Paris), E. Garbe and R. Flamant. Bull. Inst. Nat. Santé Rech. Med. 23(5):1301-1312, 1968.

A method of studying the relationship between cancer morbidity (number of new cases reported) and air pollution and alcoholism is described. Four departments of France were selected for this study: Hérault (low alcoholism, low air pollution), Les Bouches-du-Rhône (low alcoholism, high air pollution), Ille-et-Vilaine (high alcoholism, low air pollution), and Le Rhône (high alcoholism, high air pollution). The frequency of alcoholism was determined from the 1966 data for mortality from liver cirrhosis and acute or chronic alcoholism. Air pollution was studied from the 1966 data on population density, the proportion of the land area of each department occupied by cities and towns, and the number of motor vehicles/km^2 of the total area. Per capita consumption of tobacco (especially cigarettes) in 1966 was somewhat below the national av. in the 2 low-air pollution departments and tended to be above the national av. in the 2 high-air pollution departments. Data on cancer incidence in these 4 departments are not presented, but forms used to describe each new case (including data on occupation and residence, but not smoking or drinking habits) are included.

69-2124 EFFECT OF BETEL CHEWING ON THE ORAL MUCOSA. (E.) Tennekoon, G. E. (U. Ceylon, Peradeniya) and G. C. Bartlett. Brit. J. Cancer 23(1):39-43, 1969.

Cancer of the mouth (especially the buccal mucosa) is the most prevalent tumor in Ceylon (42.0% of 5963 tumors seen in 1 hospital from 1937-1942; 27.7% of 9287 tumors seen in the Ceylonese government hospitals in 1963-1964). The effects on the oral mucosa of chronic chewing of betel nut quids containing tobacco leaf were studied in 108 men. These subjects, and 42 male controls who did not chew betel, were non-smokers; a few men who chewed betel quids without tobacco leaf were excluded. Biopsy specimens of the oral mucosa showed no pathological changes in 43/108 betel chewers and 24/42 controls; the other specimens showed various types of hyperplasia, keratosis, polyposis and/or epithelial downgrowths. Premalignant mucosal changes were seen in specimens from 3/23 men who had chewed over 5 betel quids/day for over 20 yr.; these men were in the "cancer age" group. The results suggested that the effects of betel chewing on premalignant changes in the buccal mucosa are negligible, unless the exposure is heavy and prolonged. The 43% frequency of pathological changes in the oral mucosa of non-chewers indicated a role of other factors, such as dietary habits and oral hygiene. The results did not indicate whether dried tobacco leaf is carcinogenic when chewed.

69-2125 ADENOCARCINOMA OF THE LUNG. (E.) Hinds, J. R. (Green Lane Hosp., Auckland, New Zealand) and G. C. Hitchcock. Thorax 24(1):10-17, 1969.

In 1962-1966 (inclusive), 545 pts. with lung cancer were treated at this hospital. Adenocarcinomas were seen in 7.9% of the group (43 pts.) and alveolar cell carcinoma in 1.8% (10 pts.); the male:female ratio in this group was 1.9:1, somewhat lower than in the pts. with lung cancers of other types. Six pts. were light or "trivial" smokers, 15 were non-smokers, and 32 smoked over 20 cigarettes/day. In 36% of the pts., the tumors were solitary nodules which clinically (and sometimes histologically) resembled metastatic foci, but the subsequent clinical courses demonstrated that the tumors were in fact primary lung cancers.

69-2126 SKIN CANCER IN THE PROVINCE OF SANTA CRUZ DE TENERIFE. (Sp.) Febles-Padron, D., R. Garcia-Montelongo and G. Vivancos-Gallego. Actas Dermosif. (Madrid) 59(11-21):651-656, 1968.

In 1962-1965 (inclusive), 215 pts. with 219 skin tumors were treated. Most of the tumors were basal or spinal cell carcinomas (58 and 54 tumors, resp.); 4 mixed tumors, 7 melanomas and 96 unclassifiable tumors were also found. Of these tumors, 197/219 (89.95%) developed on the head and neck (60% of these on the nose, cheek and lower lip). The pt. group was approx. evenly divided between men and women; 70% of the pts. were in the 50-80 yr. age groups. Of the pt. group, 194 lived on Tenerife and the others came from nearby islands (Gomera, La Palma and Hierro). In the northern portion of Tenerife (including the La Laguna area), skin tumors were seen in 3.9/10,000 inhabitants; in the southern region (including Santa Cruz and El Rosario), skin tumors were seen in 4.08/10,000 inhabitants. These 2 regions, separated by a mountain range, have very different climates (the southern region is dry, hot and windy, whereas the northern region has a much milder climate), but the frequency of skin tumors was about the same in both regions.

69-2127 MORTALITY FROM PRIMARY TUMOURS OF BONE IN ENGLAND AND WALES, 1961-63. (E.) Boyd, J. T. (U. Coll. Hosp. Sch. Med., London), R. Doll, G. B. Hill and H. A. Sissons. Brit. J. Prev. Soc. Med. 23(1):12-22, 1969.

Mortality rates from primary bone tumors were compared in 2 series of cases, obtained from death certificates dated 1951-1953 (ages 0-74) and 1961-1963 (ages 0-64), inclusive. The diagnoses of primary bone tumors in the 0-64 age groups were confirmed in 516/990 and 553/916 cases, resp.; certification was less reliable in the 0-4 and 50-74 age groups (about 40% in each group) than in the intermediate age groups (the reliability of certification was over 90% at ages 15-19). Mortality rates at ages 0-64 yr. (both sexes) peaked at age 15-19, followed by a decline in the subsequent age groups, with another increase in the 45 and over age group (attributed to bone tumors associated with Paget's disease). Crude mortality rates at ages 0-64 yr. (av. annual rates/10 million) showed a decline in both sexes (62.9 to 53.2 in males; 38.9 to 33.4 in females) from the 1951-53 to the 1961-63 series. The general decline in age-specific mortality rates was seen in all groups except in children (both sexes) aged 5-9 yr. and in females aged 10-14 yr., but extension of these data to include 1964-1966 (inclusive; ages 0-44 only) did not show any regular trend in mortality rates. In the 39 regions of England and Wales as a whole, regional variations in bone tumor mortality were no more than could be reasonably attributed to chance, although mortality rates were somewhat lower in south-eastern England than in the other areas. No correlation was seen between standardized mortality ratios (in either time series) and the available data (for 19 areas) on long-term levels of radioactivity in the drinking water.

69-2128 BIOPSY AND PROGNOSIS OF MALIGNANT MELANOMA. (E.) Epstein, E., K. Bragg (2151 Berkeley Way, Berkeley, Calif.) and G. Linden. JAMA 208(8):1369-1371, 1969.

Analysis of about 20,000 coded diagnoses in 1 dermatology practice disclosed 559 black new growths (2.8%), of which only 12 (2.1%) were malignant melanomas. The group also included 72 pigmented basal cell epitheliomas (12.9%) and 4 juvenile melanomas (0.7%); the others were benign lesions of various types.

69-2129 CARCINOMA OF THE ESOPHAGUS IN INDIA. (E.) Desai, P. B. (Tata Mem. Hosp., Bombay, India), E. J. Borges, V. G. Vohra and J. C. Paymaster. Cancer 23(4):979-989, 1969.

From 1941-1966 (inclusive), 7973 pts. with cancer of the esophagus were seen at the authors' hospital. The age-adjusted incidence rate of this tumor in the Greater Bombay area (and presumably in the rest of India) was 14.4/100,000 in males and about 11/100,000 in females. This is the highest reported incidence rate for this tumor; the next highest rate is seen in Finland (5.4/100,000 in males). The cause of this high incidence of cancer of the esophagus is unknown, but the possible roles of the prevalent nutritional deficiencies and consumption of irritants (unspecified) in India are mentioned.

69-2130 THE INCIDENCE OF CARCINOMA OF THE LARYNX IN PERSONS UNDER TWENTY YEARS OF AGE. (E.) Jones, D. G. (Ear, Nose, Throat Hosp., Glasgow, Scotland) and C. E. Gabriel. Laryngoscope 79(2):251-255, 1969. (10 references)

The authors' case of carcinoma of the larynx in a 16-yr.-old girl brings the total number of recorded cases in the under-20 age group to 99 (52 males, 32 females, 15 of unspecified sex). Malignant transformation of juvenile laryngeal papillomatosis was reported for 12/99, and attributed to the effects of radiotherapy in several cases. It is concluded that cancer of the larynx in the under-20 age group is not as uncommon as sometimes believed (0.5% of 1680 pts. with this tumor in 1 study, 0.15% of the males and 0.54% of the females with this tumor in another study; approx. 1% of all childhood neoplasms in a third study).

69-2131 CARCINOMA OF THE GALLBLADDER: REPORT OF 45 CASES. (E.) Andrews, E. C. (U. Texas Sch. Med., San Antonio), D. E. Bennett and R. B. Arhelger. Southern Med. J. 62(5): 573-578, 1969.

The records of the Robert B. Green Memorial Hospital (San Antonio) for 1959-1967 (inclusive) disclosed gallbladder cancer in 33/63,276 female and 12/54,996 male admissions (0.521 and 0.218/1000 admissions, resp.; total, 0.03% of all admissions). The median age was 65.2 yr. (range, 30-89 yr.). The 43 unsuspected gallbladder cancers were found in a series of 1760 cholecystectomies (2.4%); gallbladder cancer was also noted in 20/2981 autopsy cases (0.6%). All pts. with gallbladder cancer had acute and/or chronic cholecystitis; cholelithiasis (a possible etiologic factor) was noted in 82% of the group. The majority of pts. (77.8%) admitted to this hospital during this 8-yr. period were of Latin-American extraction; although gallbladder diseases were common in this ethnic group (especially in women of the younger age groups), gallbladder cancer was not significantly more frequent in Latin-Americans than in the other white pts. or in the Negro pt. group (0.605, 0.475 and 0.129/1000 admissions, resp., in females; 0.228, 0.182 and 0.148/1000 admissions, resp., in males). The annual incidence of gallbladder cancer is 2.5/100,000 population/yr. (no other details).

69-2132 REGIONAL AND SOCIAL DIFFERENCES IN CANCER INCIDENCE OF THE DIGESTIVE TRACT IN THE GERMAN DEMOCRATIC REPUBLIC. (E.) Berndt, H. (Cancer Res. Inst., German Acad. Sci., Berlin), G. P. Wildner and K. Klein. Neoplasma (Bratisl.) 15(5):501-515, 1968.

A significant correlation between population density and the age-adjusted incidence of all cancers combined (1959) was found in East Germany. The age-adjusted incidence of stomach cancer declined from 1960 to 1965; it was lower in the central portion of East Germany (including Berlin) than in the northern (predominantly rural) and some of the southern (predominantly urban-industrial) regions. This regional variation could not be explained. Cancer of the esophagus was more frequent in the northern regions than in the southern regions; the highest incidence was seen in Berlin. The most important etiologic factors for this tumor were alcohol consumption and smoking. The incidence of cancer of the colon in East Germany increased from 1960 to 1965. This tumor was less frequent in the northern and central regions than in Saxony, Thuringia, Berlin and Leipzig. A correlation between the incidence of this cancer and high socioeconomic status was noted; cigar smoking is suggested as an etiologic factor. Cancer of the rectum was less frequent in the northern areas than in the central and southern areas, but the correlation between the incidence of this cancer and urbanization was not significant. This geographical variation could not be explained.

69-2133 SOME PECULIARITIES IN THE SPREADING OF THE CANCER OF THE STOMACH IN THE REGION OF THE DISTRICT ONCOLOGICAL DISPENSARY VELIKO TIRNOVO, BULGARIA. (E.) Manoilov, K. (Dist. Oncol. Dispen., Veliko Tarnovo, Bulgaria). Neoplasma (Bratisl.) 15(5):469-473, 1968.

In 1963-1967 (inclusive), 5685 new cases of cancer were registered at this center. The av. annual incidence rate/100,000 was 224.2, compared to 176.3 for all of Bulgaria. Cancer of the g.i. tract comprised 1509/5685 tumors; 1184 tumors (78.6% of the g.i. tumors; about 20% of all registered tumors) were cancer of the stomach. The av. annual incidence rate/100,000 for stomach cancer was 46.6 in this region (compared to 30.4 for all of Bulgaria), and showed little variation from 1963 to 1967. The age-standardized av. annual incidence rate/100,000 was 43.3 in males and 28.5 in females (it was higher in females than in males in 1/8 regions of this district); in urban and rural areas these rates were 28.5 and 38.3, resp. At ages 0-49, 50-59 and 60+ yr. (comprising 75.6%, 11.6% and 12.8%, resp., of the district's population), stomach cancer accounted for 5.2%, 18.2% and 76.7% of all tumors, resp. Stomach cancer was the most prevalent tumor in this district (skin and lung cancer were the next most prevalent; 19% and 11% of all cancers, resp.). A geographical variation in the stomach cancer incidence was noted within this region; the highest rate was seen in the Pavlikeni district (av. 60.6/100,000/yr.) and the lowest rates in the Dryanovo and Gabrovo districts (av. 29.5 and 22.0/100,000/yr., resp.). Regional differences in dietary habits are suggested as a reason for this variation.

69-2134 GEOGRAPHICAL DISTRIBUTION OF STOMACH CANCER IN CZECHOSLOVAKIA. (E.) Gregor, O. (U. Hosp., Prague), R. Toman, F. Prušová, V. Drnková and J. Pastorová. Gut 10(2):150-154, 1969.

In 1963, stomach cancer caused 22.0% of all cancer deaths in Czechoslovakia (6026 deaths). Age-adjusted av. mortality rates/100,000 (for the 11 regions of the nation) were 51.32 in males and 34.75 in females (a 17.2% difference); the highest age-adjusted mortality rate was seen in North Moravia (64.13 in males, 42.26 in females) and the lowest in Prague (40.86 and 27.28, resp.). In 1963, bronchopulmonary cancer caused 18.4% of all cancer deaths in Czechoslovakia (5041 deaths). Age-adjusted mortality rates/100,000 were 65.56 in males and 7.82 in females (a 77.8% difference); the highest rates were seen in West Slovakia and Prague (102.27 and 90.47, resp., in males; 8.52 and 11.18, resp., in females) and the lowest in East Slovakia (6.88 in males, 7.35 in females). Regional variations in stomach cancer mortality were not correlated with the regional variations in bronchopulmonary cancer mortality, dietary composition, alcohol consumption, or the frequency of smoking in males.

69-2135 RELATIONSHIP BETWEEN THE CLASSICAL BLOOD GROUP SYSTEM AND CANCER OF THE STOMACH, GASTRIC ULCER AND DUODENAL ULCER: COMPARISON TO NORMAL VALUES IN 5930 BLOOD DONORS. (Ger.) Schricker, K. Th. (U. Erlangen-Nuremberg, Germany) and K. Mann. Fortschr. Med. 87(7):301-304, 1969.

The frequencies of blood types A, 0, B and AB in 5930 normal blood donors were 41.8%, 41.2%, 11.6% and 5.4%, resp. In 1130 pts. with stomach cancer, blood type A was significantly increased (49.6% of the group). In 478 pts. with duodenal ulcer and 423 with gastric ulcer, blood type 0 was significantly increased (51.6% and 47.1% of the groups, resp.). Corresponding reductions in the frequencies of the other blood types (including type 0 in stomach cancer) were not statistically significant. The distribution of the Rh factor and groups A_1 and A_2 was about the same in all groups.

69-2136 CARCINOMA OF THE COLON AND RECTUM. (E.) McSherry, C. K. (New York Hosp.-Cornell Med. Ctr., N. Y.), G. N. Cornell and F. Glenn. Ann. Surg. 169(4):502-509, 1969.

From September 1, 1932-December 31, 1962, 1625 pts. (887 men, 767 women) were admitted to this hospital with carcinoma of the colon or rectum; 52.5% of the tumors involved the rectum or rectosigmoid. Each second or third primary tumor of the colon (25 and 2 pts., resp.) was considered to represent a new case. Colon cancer was more frequent in females than in males; cancer of the rectum was more frequent in males than in females. Family histories of colon cancer were reported by 85/1625 (5.1%); 9 pts. had familial polyposis and 8 had ulcerative colitis. Polyps of the colon were associated with cancer in 236 pts. (14.5%); the 2 conditions were discovered simultaneously in 154 pts. (9.5%). Synchronous and metachronous carcinomas of the colon and rectum were found in 46 and 76 pts. (2.8% and 4.7%), resp. Primary tumors of other organs or systems were noted in 145/1625 (8.7%); 23 pts. (1.4%) had synchronous tumors (mostly of the urinary tract), 56 pts. (3.5%) had prior histories of cancer (mainly of the breast or reproductive organs), and 66 pts. (3.9%) developed tumors of other sites after the treatment of cancer of the colon or rectum. The number of cases of carcinoma of the large intestine remained fairly constant during this 30-yr. period.

69-2137 ENVIRONMENTAL FACTORS OF CANCER OF THE COLON AND RECTUM. II. JAPANESE EPIDEMIOLOGICAL DATA. (E.) Wynder, E. L. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.), T. Kajitani, S. Ishikawa, H. Dodo and A. Takano. Cancer 23(5):1210-1220, 1969.

Cancer of the large intestine caused 4.9% of all cancer deaths in Japan in 1965. Cancer of the colon is significantly less frequent in Japan than in the U.S. (although the mortality rate in Japan may be increasing), whereas cancer of the rectum (with a stable mortality rate in Japan) is about equally frequent in Japan and in the U.S. white population. An interview survey of 107 Japanese pts. with cancer of the colon or rectum and 307 control subjects was conducted, to detect the influence of environmental factors. The pts. with cancer of the rectum were not significantly different from the controls in any of the parameters studied, including dietary habits (the pts. were asked about their consumption of smoked, salted or charcoal-broiled meat and fish, among other foods). The pts. with cancer of the colon tended to be of higher socioeconomic status than the pts. with cancer of the rectum or the controls, and reported a diet with more milk and fruit and less rice than the usual Japanese diet. The cancer pts. were not significantly different from the controls with respect to medical or surgical histories, body wt., serum cholesterol levels, smoking, or alcohol consumption. It is suggested that dietary fat, by affecting the composition of the intestinal flora, may influence the pathogenesis of cancer of the colon.

69-2138 EPIDEMIOLOGICAL ASPECTS OF NEOPLASTIC DISORDERS IN ISRAELI MIGRANT POPULATION. IV. CANCER OF THE COLON AND RECTUM. (E.) Mass, N. (Tel Hashomer Gov. Hosp., Israel) and B. Modan. J. Nat. Cancer Inst. 42(4): 529-536, 1969.

From 1961-1965, 1624 new cases of cancer of the colon and rectum in Israeli Jews were reported to the Central Cancer Registry; 423 other cases (including 39 in Israeli Arabs) were excluded

om consideration. The mean annual incidence/
0,000 population during the study period
ased on the 1961 census data) in Israeli Jews
s 15.4 for both tumors combined (9.0 for colon
ncer, 6.2 for rectum cancer, 0.2 for cancers
unclear location), 14.8 in males and 16.0 in
males. Age-adjusted mean annual incidence
tes/100,000 (both tumors combined) were higher
the European- and American-born (18.3 and
.0 in men and women, resp.; among the highest
tes in the world) than in the Israeli-born
4.8 and 8.3, resp.), the Asian-born (4.9 and
6, resp.), or the African-born (6.1 and 5.6,
sp.). This difference between the European-
d American-born immigrants and the other
hnic groups was particularly great in persons
er 60. No differences in incidence were seen
tween recent immigrants (1955 and later) and
rlier immigrants. A comparison of the inci-
nce rates in different residential areas (for
e over-25 age groups only) showed an excess
cidence in urban areas (Israel's 3 major
ties) over the "rural" areas (which included
me smaller cities, towns and semi-urban
mmunities). Ethnic differences in dietary and
her habits might be of etiologic significance.

-2139 EPIDEMIOLOGICAL ASPECTS OF NEOPLASTIC
DISORDERS IN ISRAELI MIGRANT POPULA-
ON. V. THE LYMPHOMAS. (E.) Modan, B. (Tel
ashomer Gov. Hosp., Israel), B. Goldman,
Shani, D. Meytes and B. S. Mitchell. J. Nat.
ncer Inst. 42(3):375-381, 1969.

ta on 955 evaluable new cases of malignant
mphoma in Israel (including both Jews and
abs), reported in 1960-1964, are presented.
an annual incidence rates/100,000 during this
riod were 9.5 in males and 7.2 in females
.3 for all cases, 7.3 for the 832 definite
ses): 2.1 for lymphosarcoma (LS), 2.0 for
ticulum cell sarcoma (RCS), 1.8 for Hodgkin's
isease (HD), 2.2 for other malignant lymphomas
L; including the undefined tumors), and 0.2
r giant follicular lymphoma (GFL). Incidence
tes for LS, RCS and ML increased sharply in
e over-50 age group; the GFL incidence showed
ittle age variation, while the HD incidence
owed 2 distinct peaks in the 20-39 and 60-69
e groups. Male:female ratios were higher in
, RCS and ML (ranging from 1.32:1 to 1.62:1)
han in HD (1.06:1) or GFL (0.5:1). The inci-
nce was higher in the African-born of the
unger age groups (especially 0-19 yr.) than
several other ethnic groups; a similar pattern
s noted in Israeli-born children of African
rigin. Another excess incidence was seen in
ropean-born immigrants in the over-50 age
roups. Incidence rates in recent and early
mmigrants were about the same. A significant
easonal variation (with a peak in June) was
oted in adult males (of all ethnic groups
xcept Arabs) with LS and RCS. This seasonal
ariation (not seen in children or in females)
ould not be explained. Incidence rates were
also higher in urban areas (Jerusalem, Haifa and Tel Aviv) than in the rest of Israel.

69-2140 EPIDEMIOLOGY OF LEUKEMIA. (Ger.) Neumann, G. (City Health Inst., Stuttgart, Germany). Internist (Berlin) 9(12): 470-476, 1968.

In West Germany (excluding the Saarland before 1955, and West Berlin before 1959), the annual leukemia mortality rates/100,000 living persons (all ages; including mortality rates from aleukemic diseases) increased from 1949 to 1964, from 4.0 to 7.0 in males, and from 2.9 to 5.8 in females. Projected mortality rates for 1967, 1970 and 1972 were 7.6, 7.9 and 8.2, resp., in males, and 6.3, 6.7 and 6.9, resp., in females. Leukemia mortality rates in children under 15 showed less change than the mortality rates in adults (in fact, the mortality rates in infants under 1 yr. decreased during this time); the greatest increases in the leukemia mortality rates from 1949 to 1966 were seen in persons over 65. For the period 1964-1966, av. annual leukemia mortality rates for all of West Germany were 7.1 in males and 6.4 in females (total, 6.4). The rates were above this national av. in Bremen (9.2 in males, 5.9 in females; total, 7.4) and especially in West Berlin (10.1, 8.8 and 9.4, resp.); in Hesse and the Saarland, the rates were below the national av. (6.3 and 6.2 in males; 5.0 and 4.7 in females; totals, 5.6 and 5.4, resp.). Leukemia mortality rates were generally higher in urban areas than in rural areas.

69-2141 RHEUMATOID ARTHRITIS AND CHRONIC LYMPHOCYTIC LEUKEMIA: STUDY OF 7 CASES OF BOTH DISEASES COMBINED. (Fr.) Druet, P. (Lariboisière Hosp., Paris), A. Dryll, A. Ryckewaert, S. De Sèze and M.-F. Kahn. Sem. Hop. Paris 45(8):489-498, 1969.

From 1958-1966, about 56,000 pts. with various rheumatic diseases, including 1733 with rheumatoid arthritis (RA), were seen at this hospital. Chronic lymphocytic leukemia (CLL) developed in 4 pts. of the group with RA (0.23% with RA, 0.007% with rheumatic diseases) from 4- about 22 yr. after the diagnosis of RA. Since the expected number of cases of CLL in the group of 1733 pts. with RA was only 0.2, it is concluded that the CLL frequency was significantly higher than expected in this group. Three other pts. with RA and CLL (referred to the authors after CLL was found) and 4 pts. with other malignant lymphoproliferative diseases associated with RA (2/4), lupus arthropathy (1/4) or arthralgia of undetermined type (1/4), are also described. The authors' pt. group also included 7 pts. with RA and benign monoclonal gammapathy (not resembling multiple myeloma or Waldenström's macroglobulinemia). It is suggested that the presumed (but not proved) immunological deficit present in RA might favor the development of a mutant clone of malignant lymphoid cells, and/or that both RA and CLL might be of viral origin.

69-2142 MATERNAL-AGE AND BIRTH-ORDER EFFECTS IN CHILDHOOD LEUKEMIA: AGE OF CHILD AND TYPE OF LEUKEMIA. (E.) Stark, C. R. (NCI, Bethesda, Md.) and N. Mantel. J. Nat. Cancer Inst. 42(5):857-866, 1969.

The effects of maternal age (tabulated in 5-yr. age groups) and birth order on the risk of leukemia death in childhood were studied on the basis of data on 705 children, born in Michigan between 1950 and 1964, who died of myelocytic (79/705) or non-myelocytic leukemia (626/705) during the same time period. A positive correlation between maternal age and death from leukemia was seen in the fourth through eighth yr. of life (with a possible peak in the fifth yr.). The leukemia mortality risk in first-born children was higher than the statewide av. value; this birth-order effect was strongest in the third through tenth yr. of life. However, the maternal-age and birth-order effects were significant only for non-myelocytic leukemia. It is concluded that the effects of these 2 factors are limited to children dying of non-myelocytic leukemia at the ages of peak leukemia mortality risk.

69-2143 LEUKEMIA IN CLOSE RELATIVES - ACCIDENT OR PREDISPOSITION? (E.) Gunz, F. W. (U. Otago Sch. Med., Dunedin, New Zealand) and A. M. O. Veale. J. Nat. Cancer Inst. 42(3): 517-524, 1969.

The cancer and leukemia incidence was studied in about 250 living and dead first-degree relatives of 54/62 pts. with chronic lymphocytic leukemia (CLL), comprising nearly all new CLL cases seen in the South Island of New Zealand (N.Z.) in 1962-1966. Including the 54 index cases, leukemia and allied diseases occurred in 1.2 persons/family; the 13 such cases in relatives occurred in 1 son, 8 brothers and 3 sisters of CLL pts. No acute leukemias were confirmed in any of the relatives. Assuming no further leukemia deaths, the expected leukemia mortality rate in the siblings of CLL pts. would be 2.3% (4.6% in the brothers), compared to the 0.65% lifetime expectation (at birth) of death from leukemia in N.Z. The lymphosarcoma and myeloma risk in the siblings (3 and 2 cases, resp., were found) might also be increased. Including the index cases, 0.8 other cancers/family were found, in 3/54 with CLL and 39 of their relatives (13 other relatives were excluded, because the reports of their cancers were not confirmed). The incidence of other types of cancer in CLL pts. and their relatives was not significantly higher than the over-all incidence in N.Z., but the distribution was unusual; no bronchial cancers were found, and only 1 case of skin cancer (in a pt. with CLL). Including the index cases, 34/54 families showed more than 1 cancer cases: 2 cases each in 18/34, 3 cases each in 12/34, 4 cases each in 3/34 (1/3 families included 2/5 siblings with CLL and 1/5 with chronic granulocytic leukemia), and 1 family with 5 cases (including 2/15 siblings with CLL). The CLL pts. differed from their relatives in showing low mean serum γ-globulin levels; they differed from the N.Z. population in showing an unusual haptoglobin distribution, with a deficit of type Hp 1/1. Genetic factors probably had some effect on this familial aggregation, but the mechanism of this action was undetermined.

69-2144 CHILDHOOD LEUKEMIA IN CALIFORNIA-BORN TWINS. (E.) Jackson, E. W. (California State Dept. Pub. Health, Berkeley), F. D. Norris and M. R. Klauber. Cancer 23(4): 913-919, 1969.

In 1940-1964 (inclusive), 145,708 individual twins were born (after at least 20 wk. of gestation) in California, and about 125,800 survived to 1 yr. of age. From 1940-1967 (inclusive through 1966; the 1967 data were incomplete), 50 California-born twins died of leukemia at age 0-14 yr. These 50 children (including 4 Negro and 2 Japanese children) belonged to 30 like-sex twin pairs (58%, compared to a 66% frequency in all U.S.-born twins) and 20 male-female pairs. The male:female ratio in the group with leukemia was 1.17:1 (compared to 1.20:1 in California single-born children with leukemia). The estimated frequency of monozygotic (MZ) pairs in this group (8 pairs = 16.6%) was much below the MZ frequency in all California-born twins (approx. 36%). This group included 2 apparently MZ twin pairs (1 male, 1 female) with leukemia, for a concordance of 25%. In the 46 discordant twin pairs, the leukemic children (especially the females) were heavier at birth than their non-leukemic co-twins; most of the leukemic twins (15/27 males, 16/23 females) were the first-born twins, but when the data for birth wt. and sex composition were controlled, the independent twin birth order effect was not noted. The leukemia deficit in California-born twins (compared to leukemia mortality rates in single-born children in 1940-1966) was 8% (4 cases), even after eliminating the effects of the high perinatal mortality in twins (which might indicate a selective reduction of susceptible subjects). The 25% concordance of leukemia in MZ twins might indicate a combined effect of genetic predisposition and fetal X-ray exposure.

69-2145 RELATIVE FREQUENCY AND MORTALITY RATE OF VARIOUS TYPES OF LEUKEMIA IN JAPAN. (E.) Nishiyama, H. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan), J. Mokuno and T. Inoue. Gann 60(1):71-81, 1969.

he "Annual of Pathological Autopsy Cases in
apan" publications for 1958-1965 (inclusive)
eported 3925 cases described as leukemia by
linical and/or pathological criteria; 3294
ases were pathologically confirmed as leukemia
the other 284 diagnoses were mistaken), but the
athological (cell type) and clinical (chroni-
ity) diagnoses were in agreement in only 1950/3294
59.2%) of these cases. Relative frequencies of
he different leukemias and leukemia mortality
ates (1961-1962) for Japan were calculated on
he basis of these 1950 cases. Acute granulo-
ytic leukemia was the most frequent type
54.5%), followed by chronic granulocytic (CGL;
4.6%), acute lymphocytic (8.1%), acute mono-
ytic (6.8%), erythroleukemia (2.5%) and chronic
ymphocytic leukemia (CLL; 1.3%). Total acute
eukemia mortality rates/million population/yr.
eaked at ages 0-9 and 60-69 (28.88 and 39.59,
esp.); the chronic leukemias (especially CLL)
ere seen predominantly in the older age groups.
he sudden decline in the leukemia mortality rate
all types combined) in the over-70 age group
26.09, compared to 47.61 at age 60-69) seemed
o be a phenomenon unique among the Japanese.
ortality rates/million population/yr. for all
eukemias combined in the U.S. (white population
nly; 1943-1952), Israel (1960-1963) and Sweden
1961-1963) were 2.1, 2.4 and 3.0 times higher
han in Japan, resp.; the greatest difference
as seen in the CLL mortality rates in the U.S.,
srael and Sweden, which were 39.3, 41.0 and 91.8
imes higher than in Japan, resp.

9-2146 THE LYMPHOMAS OF BRAZILIAN CHILDREN.
(E.) Dalldorf, G. (Oxford, Md. 21654),
.P.S. Carvalho, M. Jamra, P. Frost, D. Erlich
nd C. Marigo. JAMA 208(8):1365-1368, 1969.

he records of the Hospital das Clinicas (São
aulo) disclosed 1847 malignant tumors in
hildren (under 15) over the last 10 yr. Lympho-
eticular neoplasms accounted for 509 tumors
40%), about 50% of which (279) were leukemias;
he other 230 neoplasms were solid tumors (107
ymphosarcomas, 71 Hodgkin's granulomas, 26
eticulum cell sarcomas) and 6 were classified
s Burkitt's lymphomas (BL). Lymphoreticular
umors in this Brazilian group were about as
revalent as in the U.S. and Kenya (about 40%,
0% and 45%, resp., of all childhood neoplasms),
ut solid lymphoreticular tumors accounted for
nly about 5% of all childhood neoplasms in the
.S. and more than 40% in Kenya. Examination of
era from these children and from Brazilian
dults and children without malignant disease,
or the presence of antibodies against the
ijoye antigen, showed that infection with EB
irus was about as prevalent in Brazil as in
frica and the U.S. Antibody levels were high
n the children with lymphoma as a group, but
nly 1/6 with BL showed very strong serologic
eactivity. It is suggested that the lympho-
eticular neoplasms of childhood represent a
pectrum of disease types, and that the relative
frequencies of various tumor types depend on the actions of secondary, environmental factors such as malaria (which is not as prevalent in Brazil as in Africa) and EB virus infection, rather than a unique primary etiologic agent.

69-2147 HODGKIN'S DISEASE IN CHILDHOOD: AN EPIDEMIOLOGIC STUDY. (E.) Fraumeni, J. F., Jr. (NCI, Bethesda, Md.) and F. P. Li. J. Nat. Cancer Inst. 42(4):681-691, 1969.

Hodgkin's disease (HD) in children in the U.S. was studied from death certificates for 359 children (under 15) dated 1960-1964, and hospital records for 33 of these children and 281 others (under 17), obtained in various periods from 1940-1968. HD mortality rates were about the same in white and non-white children (the U.S. av. rate was 1.22/million/yr. in white children in 1960-1964), in contrast to the higher mortality rate from adult HD seen in the Negro population. The HD mortality rate in children was significantly higher than the national av. in the West-South Central division (1.87; the adult HD mortality rate in this area is the nation's lowest), and significantly below the national av. in the Pacific division (0.79). HD morbidity and mortality increased steadily with age; the much earlier increase in HD morbidity in boys resulted in a 3:1 male excess. The decline in the sex ratio from age 10-12 yr. suggested a transition to the young-adult pattern at this age. Males dying of HD showed a significant seasonal variation in birth mo. (1 peak in July-August and a smaller peak in October-November), suggesting an action of sex-limited, seasonally prevalent environmental agents early in life. The absence of both an early peak of HD mortality and an association with specific congenital anomalies, suggested the relative unimportance of prenatal influences. The 314 hospital records disclosed 14 family histories of malignant disease, including HD in 2/9 siblings and 1/5 parents. It is suggested that patterns of HD occurrence in children and young adults may result from exposure or enhanced susceptibility to some environmental factor(s) close to birth.

69-2148 RESULTS OF TREATMENT OF BREAST CANCER IN SOUTH-EAST ENGLAND. (E.) Dixon, R. A. (South Metropol. Cancer Reg., Sutton, England). Brit. J. Cancer 23(1):9-20, 1969.

Between 1960 and 1962, an av. of 3247 cases/yr. of breast cancer were reported in women residing in the region served by the South Metropolitan Cancer Registry; the annual registration rate was 7.4/10,000 population, corresponding to 25% of all cancers in females. The registration rates for all cancers in females increased sharply in the over-40 age groups, reflecting the effect of the menopause on breast cancer morbidity. Breast cancer morbidity in the younger women accounted for much of the increased registration rate seen in the 30-50 age group.

69-2149 ENDOCRINE INFLUENCES ON HUMAN MAMMARY CANCER FORMATION. A CRITIQUE. (E.) Lemon, H. M. (U. Nebraska Sch. Med., Omaha). Cancer 23(4):781-790, 1969. (77 references)

Caucasian (but not Japanese) women with untreated breast cancer or fibrocystic disease of the breast show abnormal patterns of C18 steroid excretion (a low ratio of estriol relative to estrone or estradiol). Evidence is presented to suggest a relationship between this abnormal pattern of C18 steroid excretion and a high breast cancer risk; experimental evidence suggesting an anticarcinogenic effect of estriol is also discussed. Women with untreated breast cancer (but apparently not premenopausal Caucasian women with fibrocystic disease of the breast) show abnormal patterns of C19 steroid excretion (a low ratio of androsterone and etiocholanolone, relative to 17-hydroxycorticosteroids). It is pointed out that these abnormal patterns of C18 and C19 steroid excretion (which are also found in pts. with hyperthyroidism and bronchial asthma, resp.), can be recognized and treated in premenopausal women.

69-2150 EPIDEMIOLOGY AND POSSIBLE IDENTIFICATION OF HIGH-RISK GROUPS THAT COULD DEVELOP CANCER OF THE BREAST. (E.) Dunn, J. E., Jr. (State California Dept. Pub. Health, Berkeley). Cancer 23(4):775-780, 1969.

In the U.S., 35-yr.-old women have an av. life expectancy to age 77 yr., and a 6-7% probability of developing breast cancer. A comparison of the relative risks of breast cancer in women according to marital status suggested that 75-80% of all breast cancers could be found in 60-65% of the female population over 35 (women with no more than 2 children). Evidence is presented to suggest that the high-risk group could be defined further still by a study of the patterns of 17-hydroxycorticosteroid and etiocholanolone excretion; in this study, the results suggested that 80% of all breast cancers could be found in 50% of the female population. The breast cancer risk may also be affected by such factors as the history of lactation, the age at menarche, and family histories of breast cancer (especially in mothers and sisters), but these variables cannot yet be summated with the factors of marriage and fertility.

69-2151 MAMMARY CANCER TRENDS. (E.) Cutler, S. J. (NCI, Bethesda, Md.) and R. R. Connelly. Cancer 23(4):767-771, 1969.

Breast cancer incidence, mortality and survival rates from 1940-1964 (inclusive) were studied, on the basis of data for 53,452 women compiled by the End-Results Group (data from the Connecticut and California tumor registries, with additional data from other hospitals throughout the U.S.). The data suggested an increase in the age-adjusted incidence rate over this period (primarily in women under 55), but a decline in the age-adjusted mortality rates. The 5-yr. survival rates were also higher in 1955-1959 than in 1940-1949. The improved survival rates were attributed to improved treatment methods and to a decline in the proportion of the pt. group showing advanced disease at diagnosis.

69-2152 BREAST CANCER ASSOCIATED WITH PREGNANCY. (E.) Lynch, G. A. (Northern Ireland Radiother. Ctr., Belfast). Ulster Med. J. 38(1):34-46, 1969.

Over an 11-yr. period, 337,342 births were registered in Northern Ireland (population 1.4 million). Over the same period, the records of the Northern Ireland Radiotherapy Centre disclosed 3031 cases of breast cancer. Pregnancy complicating breast cancer was noted in 1.9% of this group (59/3031); in the pts. under 40 with breast cancer, the frequency of pregnancy was 19%. In 45 pts., breast cancer appeared during pregnancy or lactation; the other 14 pts. became pregnant after treatment of breast cancer. The frequency of breast cancer in pregnancy in this series was 1 case/7500 births.

69-2153 MASS SCREENING IN MAMMARY CANCER. (E.) Strax, P. (Mt. Sinai Sch. Med., New York, N. Y.), L. Venet and S. Shapiro. Cancer 23(4):875-878, 1969.

A mass screening program for breast cancer was begun in 1963; the participants were about 62,000 women (aged 40-64 yr.) enrolled in the Health Insurance Plan of Greater New York, comprising 31,000 women asked to appear for repeat examinations at 1-yr. intervals (20,000 responded; the other 11,000 were the "study group not examined") and 31,000 matched controls. As of March, 1968, the initial and first follow-up examinations had been completed, and some women had undergone the second or third annual follow-up examinations. Breast cancer detection rates/1000 person-yr. in the controls and the "study group not examined" were 1.48 and 1.02, resp.; in the screened study group, detection rates at the first and subsequent examinations were 2.72 and 1.38, resp. (between examinations, the detection rate was 0.62/1000 person-yr.). Axillary lymph node involvement was absent in 41% of the controls with breast cancer; in the first and subsequent examinations of the screened study group, axillary lymph node involvement was absent in 65% and 71%, resp., with breast cancer. The importance of combined clinical examination and mammography is emphasized; without mammography, the initial and subsequent examinations of the screened study group would have missed 38% and 29% of the cancers, resp., and more than 40% of the cancers would have been missed without clinical examination. A new

mmography device for mass screening studies is
escribed.

-2154 CANCER MORTALITY AMONG NUNS: ROLE OF
MARITAL STATUS IN ETIOLOGY OF NEO-
LASTIC DISEASE IN WOMEN. (E.) Fraumeni,
F., Jr. (NCI, Bethesda, Md.), J. W. Lloyd,
M. Smith and J. K. Wagoner. J. Nat. Cancer
st. 42(3):455-468, 1969.

ncer mortality patterns in 31,658 Catholic
ns (from 41 religious orders in the U.S.) were
udied on the basis of 5792 death certificates
ted 1900-1954 (inclusive), and compared to
rtality patterns in the U.S. white female
pulation (irrespective of marital status).
e study group of nuns comprised only white,
tive-born, never-married women who had entered
e convents before age 27; household and manual
rkers, nurses and foreign missionaries were
cluded from the group. Mortality rates from
l cancers combined were somewhat lower in the
ns than in the controls up to age 59 or 69 yr.,
d somewhat higher than in controls in the
der age groups. Mortality rates from cancer
the breast, corpus uteri and ovary were
gher in the nuns than in the controls (reflect-
g the effects of infertility), while mortality
tes from cancer of the cervix uteri were
gher in the controls than in the nuns (reflect-
g the effects of coitus). The nuns also
owed an excess frequency of cancer of the
rge intestine, especially in the postmenopausal
riod, suggesting the action of hormonal factors
the frequency of this tumor. Other forms of
ncer were about equally frequent in both
oups.

-2155 SERUM HAPTOGLOBIN TYPE IN FEMALES
WITH GENITAL CANCER. (E.) Miluničová,
(Charles U., Prague), A. Jandová and V. Škoda.
Nat. Cancer Inst. 42(5):749-751, 1969.

662 normal residents of Prague, the frequen-
es of haptoglobin genes Hp^1 and Hp^2 were
4093 and 0.5907, resp., (not significantly
fferent from theoretical values). Haptoglobin
pes Hp 2-1, Hp 2-2 and Hp 1-1 were noted in
.73%, 35.19% and 17.08%, resp., of this normal
oup. In 291 women with cancer of the corpus
eri (142), cervix uteri (85), ovary (50) or
lva (14), and in 170 women with atypia (44) or
n-malignant diseases (126) of the endometrium,
e distribution of haptoglobin types was not
gnificantly different from normal values. The
equencies of haptoglobin types were about the
me in pts. with cancer of different types and
tes, and were not correlated with the fre-
encies of the ABO blood groups, the Rh/Hr
notype, or the Gm serum group (the distribu-
ons of these 3 genetically determined char-
cters are not stated).

69-2156 FACTORS INFLUENCING CANCER OF THE UTERINE CERVIX IN NORTH INDIA. (E.) Wahi, P. N. (S.N. Med. Coll., Agra, India), S. Mali and U. K. Luthra. Cancer 23(5): 1221-1226, 1969.

In 1960-1963, a screening study in Agra disclosed cervix cancer in 693/39,587 women over 15, including 643/34,665 Hindus (18.5/1000), 46/4776 Moslems (9.6/1000) and 4/146 Christians. Incidence rates/1000 were highest in the 50-54 age group (175.4 in Hindus, 122.8 in Moslems); cervix cancer was found in Hindus of all age groups, but no cervix cancers were seen in Moslems aged 15-24 or 65-70+ yr. Only 17 cervix cancers were classified as carcinoma in situ. Early marriage, early pregnancy, multiple pregnancies and low socioeconomic status were significant. The majority of the cancer pts. were of low socioeconomic status. Av. ages at marriage in cancer pts. and controls were 13.6 and 15.6 yr., resp.; highest incidence rates were seen in Hindus who were married at or before age 10 yr. (49.4/1000) and in Moslems who were married at age 11-13 yr. (15.9/1000). In women with 9 or more children, the risk of cervix cancer was 95 times greater than in nulliparas; the cervix cancer incidence in married, childless women (1.2/1000 in Hindus, 0.9/1000 in Moslems) was twice as high as in unmarried women. The lower rate of cervix cancer in Moslems than in Hindus was attributed to the effects of circumcision. Cancer of the cervix accounted for 30.6% of all female cancers seen in this part of northern India, compared to 23.3% in Calcutta, 13% in Bombay, 28.3% in Hyderabad and 27% in Visakhapatnam.

69-2157 CARCINOMA OF THE CERVIX IN AMERICAN INDIAN WOMEN. (E.) Jordan, S. W. (U. New Mexico, Albuquerque), R. A. Munsick and R. S. Stone. Cancer 23(5):1227-1232, 1969.

From July, 1966-June 30, 1968, cervical smears were obtained from 18,064 women (over 15) of known race, residing in New Mexico (mostly in Bernalillo County). Nearly all persons in the study population were of low socioeconomic status. The occurrence of cancer of the cervix in Indian women was compared to that in non-Indian controls, matched for age and socioeconomic status. The smears were classified as suspicious in 59/10,168 Indian and 86/7896 non-Indian women (5.8 and 10.9/1000 subjects, resp.); this difference between Indians and non-Indians was statistically significant only in the 30-39 yr. age group. Cancer of the cervix was about as frequent in the Spanish-American women (an unknown number of whom were probably of mixed Indian and non-Indian ancestry) as in the "Anglo" and Negro women. Despite such conditions as poverty, multiple pregnancies, early coitus and uncircumcised partners, the

Indian women showed a lower frequency of histologically verified cancer of the cervix than the age-matched non-Indian controls (3.3 and 7.9/1000, resp.). This difference was attributed to a delay in first pregnancy among the Indian women, which apparently resulted from a period of transient adolescent sterility.

69-2158 RURAL PREPONDERANCE OF SEMINOMA OF THE TESTIS. (E.) Lipworth, L. and A. D. Dayan (National Hosp., London). Cancer 23(5): 1119-1121, 1969.

In 1961-1963 (inclusive), 828 seminomas and 549 other testicular tumors (including 30 tumors in children aged 0-14 yr.) were registered in England and Wales. The av. annual incidence rates/million in the rural areas were significantly higher than the rates in the urban areas with respect to seminoma (14.8 and 12.0, resp.), but not with respect to testicular tumors of other types (8.3 and 8.4, resp.). The observed/expected ratio of new cases of seminoma in the rural areas (based on age-adjusted rates for the large cities) was 1.30:1, compared to 1.27:1 for squamous cell carcinoma of the skin (1961 data only). The av. annual incidence rate (age-adjusted) for all testicular tumors was 2.1/100,000 males, compared to 2.2-2.6 in several studies from the U.S. (1941-1964) and 4.0 in Denmark (1953-1957; previously published). The urban-rural difference in this England + Wales study was the reverse of the urban-rural difference seen in Denmark (1958-1962); av. annual incidence rates/100,000 males in Copenhagen and Danish rural areas were 6.3 and 3.7, resp. Neither this discrepancy nor the higher incidence rates in Denmark (compared to England + Wales or the U.S.) could be explained.

69-2159 NEOPLASMS OF THE TESTICLES AMONG THE CEYLONESE. (E.) Vdeyaratnam, G. (U. Ceylon, Peradeniya). Ceylon Med. J. 13(4): 193-200, 1968.

From 1954-1965 (inclusive), 70,053 biopsies were recorded by the Department of Pathology, University of Ceylon; 387 (0.005%) were testicular biopsies, and 45/387 specimens showed testicular tumors. The predominant tumors were teratomas (18/45 = 40%), seminomas (17/45 = 37.7%) or mixed seminomas and teratomas (4/45 = 8.8%); the group also included 3 benign adenomatous tumors, and 1 case each of interstitial cell tumor, Sertoli cell tumor and lipoma. Two teratomas and 4 seminomas developed in undescended testes. No histories of trauma were reported. The majority of pts. (69%) were in the 20-50 yr. age group, but the group included 1 infant (8 mo. old) with a teratoma and a 16-yr.-old boy with an adenomatous tumor. These data were in agreement with those reported for tumors of the testis in Great Britain and Ireland (1958-1963 inclusive; previously published).

69-2160 CANINE MASTOCYTOMA: EXCESS RISK AS RELATED TO ANCESTRY. (E.) Peters, J. A. (NCI, Bethesda, Md.). J. Nat. Cancer Inst. 42(3):435-443, 1969.

The age- and sex-adjusted relative risks of canine mastocytoma were studied in a group of 230 dogs (representing 39 breeds) and a control population of 38,398 animals. All animals were of known age, sex and breed. Relative risks of canine mastocytoma in boxers, Boston terriers and a small group of bull terriers were 16.7, 8.0 and 118.8, resp.; for these 3 breeds combined, the relative risk was about 14. A higher than expected number of cases (7 observed, 2.8 expected) was also noted among pointers, and a lower than expected number of cases in 6 other breeds (beagles, collies, Cocker spaniels, Chihuahuas, German shepherds and poodles); in the other breeds, the observed and expected numbers of cases were about equal. Evidence is presented to suggest that the increased susceptibility to canine mastocytoma in boxers, Boston terriers and bull terriers might be traceable to a strong genetic relationship to the bulldog and/or the English terrier. The case group included no Staffordshire terriers (only 1 was seen in the control group), a breed also related to the bulldog and English terrier, so the relative risk of mastocytoma in this breed could not be determined from these data.

69-2161 THE PATHOLOGY OF URINARY BLADDER TUMOURS IN KENYA ZEBU CATTLE. (E.) Mugera, G. M. (U. Coll., Nairobi, Kenya), P. Nderito and A. O. Sorheim. J. Comp. Path. 79(2):251-254, 1969.

A 6-mo. survey of about 83,000 cattle slaughtered in Kenya disclosed bladder tumors in 62/50,000 pure Zebu cattle (av. frequency of 1/1000 cattle slaughtered), but no bladder tumors were seen in 32,900 ranch cattle of pure European, European cross-bred, or pure Boran breed. The 62 bladder tumors were found in 33 females and 29 steers (aged 2-5 yr.), and included 25 transitional cell papillomas, 13 transitional cell carcinomas, 12 adenocarcinomas, 6 squamous cell carcinomas and 6 adenomas. The 32,000 ranch cattle came from regions 4000-6000 feet above sea level, from which the brush had been cleared. The animals with bladder tumors came from districts 1000-4000 feet above sea level, mainly dry with thorny bushes; plants of the genus Encephalartosis (which contains a toxic and carcinogenic factor) are found in these areas, but bracken fern (associated with enzootic hematuria and bladder tumors in cattle) does not grow there, and enzootic hematuria has not been reported in these areas. None of the animals with bladder tumors showed any signs of hematuria or tumors of other sites. It is suggested that the bladder tumors might be related to a virus or to toxic range plants.

9-2162 TUMORS OF THE THYMUS IN CATTLE, SHEEP, AND PIGS. (E.) Sandison, A. T.
J. Glasgow, Scotland) and L. J. Anderson.
ancer Res. 29(5):1146-1150, 1969.

1-yr. survey of 100 abattoirs throughout Great ritain (accounting for about 33% of all animals laughtered in Great Britain during this period) isclosed tumors in 302/1.3 million cattle, 07/4.3 million sheep and 139/3.7 million swine, ncluding 55, 6 and 35 tumors, resp., involving he thymus. The thymic tumors included 16 hymomas of apparently benign type (15/55 thymic umors in cattle, 1/6 in sheep, 0/35 in swine); 3/16 were predominantly epithelial and 3/16 ere predominantly lymphocytic. Thymomas omprised 5% of all bovine neoplasms in this eries. The other thymic tumors (40/55 in attle, 5/6 in sheep, 35/35 in swine) were hymic lymphosarcomas, comprising 40/75 of all ymphosarcomas seen in cattle, 5/44 in sheep and 5/92 in swine during this period. The 16 hymomas were seen only in adult animals, hereas the thymic lymphosarcomas in cattle and wine showed a high incidence in immature nimals. Of the thymic lymphosarcomas, 8/40 in attle, 1/5 in sheep and 6/35 in swine were ocalized in the thymus. The incidence of hymic lymphosarcoma was higher in this series f British cattle than in Scandinavia, Germany r the U.S., but no evidence of enzootic bovine ymphosarcoma was noted in Great Britain, and he bovine lymphosarcomas occurred sporadically.

9-2163 SOME TRENDS IN COMPARATIVE ONCOLOGY. (E.) Chaklin, A. V. (Inst. Exp. Clin.
ncol., Acad. Med. Sci., USSR, Moscow), V. I.
onomarkov and L. V. Orlova. *Neoplasma* *(Bratisl.)*
5(5):543-548, 1968.

ecently established programs for the study of ancer epidemiology in domestic and wild animals are discussed. In the USSR, such research is carried out by the Zoo-Oncological Clinic (Moscow). The records of this clinic disclosed 2 cases of leukemia occurring simultaneously in dogs and their owners, and 1 case in which the same form of reticulosis occurred in 2 dogs belonging to the same person. In 1 study of 12,000 dogs seen at Moscow veterinary hospitals from 1962-1965, neoplasms accounted for about 10% of all non-infectious diseases. The high frequency of mammary tumors (31.5% of the observed tumors) was explained at least partly by the 2.1:1 female preponderance in the study group. Skin tumors accounted for 20.4% of the total and skeletal tumors for 11.4%. Cooperation between the veterinarian and the physician is stressed, to provide better data on the occurrence of tumors in domestic animals and their owners.

69-2164 CONFERENCES ON CLINICAL PRACTICES. CONE BIOPSY OF THE CERVIX. (E.)
McCaffrey, R. M. *Bull. Sloane Hosp. Wom. N.Y.*
15(1):1-6, 1969.

69-2165 SELF COLLECTING SMEAR. (A MASS SCREENING STUDY OF UTERINE CANCER).
(E.) Yokoyama, Y. (Ctr. Adult Dis., Osaka, Japan), R. Iwata, T. Majima, J. Hongo, S. Murakami and Y. Takahashi. *Nippon Sanka-Fujinka Gakkai Zasshi* (*J. Jap. Obstet. Gynec. Soc.*) 15(4):215-222, 1968.

69-2166 CANCER OF THE CERVIX UTERI; WITH PARTICULAR REFERENCE TO CYTOLOGY.
(E.) Jordan, J. A. (U. Birmingham, England).
Practitioner 202(1209):351-362, 1969.

See also abstract nos.: 1997,2099,2130,2149,2167

69-2167 PRELIMINARY OBSERVATIONS ON THE INCIDENCE OF NEOPLASMS AND ON THE ENZYMATIC AND PROLIFERATIVE BEHAVIOR OF TUMOR TISSUES IN PERSONS WITH GLUCOSE-6-PHOSPHATE DEHYDROGENASE (G6-PD) DEFICIENCY. (It.) Sulis, E. (U. Cagliari, Italy) and G. Spano. Boll. Soc. Ital. Biol. Sper. 44(15):1246-1249, 1968.

In Sardinia, where glucose-6-phosphate dehydrogenase (GPD) deficiency is found in 13-15% of the population (in some regions of this island, the frequency is 30-35%), total cancer mortality is much lower than in the rest of Italy (108 and 169/100,000 population, resp.; no other details). One local habit associated with a relatively high cancer frequency in males in Sardinia is smoking cigars with the lighted end in the mouth; these men often develop cancer of the palate. The records of the Tumor Center of Cagliari disclosed 140 pts. with carcinoma of the palate, many of whom smoked in this way. In this group, the frequency of GPD deficiency was about 7% (11 pts.). These 11 GPD-deficient men had smoked cigars with the lighted ends in their mouths for 30-40 yr., but only 2 pts. had advanced cancer with laterocervical metastases, and the tumors seemed to be generally of low malignancy in these pts. Some GPD activity was found in tumor tissues from 3 untreated GPD-deficient pts., but the levels of activity were much lower than in tumor tissues from pts. without GPD deficiency. It is concluded that a deficiency of this enzyme of the pentose phosphate cycle, by causing a deficiency in DNA and RNA synthesis, retards the proliferation of cells in general and of malignant cells in particular.

69-2168 MULTIPLE MALIGNANCY IN THE UPPER GENITAL CANAL. (E.) Woodruff, J.D. (Johns Hopkins U. Sch. Med., Baltimore, Md.) and C. G. Julian. Amer. J. Obstet. Gynec. 103(6):810-822, 1969.

The origins and spread of malignant tumors of the ovary, Fallopian tube and uterine fundus were studied, on the basis of an examination of 397 primary tumors of these sites and 118 secondary tubal tumors. The common origin of the epithelial layers of the paramesonephric system and of the ovarian germinal epithelium, suggested that these cells would respond to a carcinogenic event in the same way. Some of the multiple tumors observed apparently represented multicentric foci of origin, rather than metastatic tumors. Passage of the tumor cells through the tubes (resulting in anaplastic changes in the tubes or endometrium, either by biological stimulation or by direct implantation) seemed to be more important than lymphatic or vascular dissemination of the tumor cells.

69-2169 ADENOCARCINOMA OF THE CERVIX UTERI IN A 28-YEAR-OLD WOMAN WITH THE PEUTZ-JEGER SYNDROME. (Ger.) Kese, G. (U. Women's Clin., Cluj, Rumania). Zbl. Gynaek. 91(7):215-218, 1969.

A 28-yr.-old woman with the Peutz-Jeger syndrome (who had undergone resection of the small intestine for polyposis 7 yr. previously) underwent hysterectomy for adenocarcinoma of the cervix. No signs of intestinal polyposis were noted at that time. This pt., whose father and uncle died of stomach cancer, had received radiotherapy for centrofacial (perioral) lentiginosis 13 yr. previously. The possible combined effects of this radiotherapy (dose not stated) and the familial disease are briefly discussed.

69-2170 LDH-ISOENZYME PATTERNS IN THE NON-MALIGNANT AND MALIGNANT UTERINE CERVIX. (E.) Langvad, E. (Fibiger Lab., Lyngby, Denmark) and S. N. Pedersen. Cancer 23(5):1171-1175, 1969.

In biopsy specimens of the cervical epithelium obtained from 64 women with non-malignant genital diseases, the lactate dehydrogenase (LDH) isoenzyme ratio (LDH$_{IV}$/LDH$_{II}$) varied cyclically. The highest ratio was seen in tissues obtained during the secretory phase. In specimens from 54 women with suspected preinvasive or invasive cancer of the cervix, the LDH isoenzyme ratio was not elevated (in contrast to the elevated ratio seen in other cancers); in addition, no significant cyclic variations were noted, even in specimens from cancer pts. which contained no tumor tissue. It is suggested that this absence of a cyclic variation in the LDH isoenzyme ratio, reflecting a decreased response of the tumor-bearing epithelium to hormonal stimuli, indicates dedifferentiation of this tissue and may be a very early sign of malignant transformation.

69-2171 LDH ACTIVITY IN URINARY SCHISTOSOMIASIS AND ITS COMPLICATIONS. (E.) Sayed, W. A. (Ein Shams U., Cairo), S. Bassily, Y. Mohran, S. A. Wassef and Y. A. Ghaffar. Brit. J. Cancer 23(1):73-77, 1969.

In 22 healthy Egyptian adults and 36/54 pts. with schistosomiasis, urinary lactate dehydrogenase (LDH) levels were within normal limits (less than 3000 U/8-hr. sample). The elevated LDH levels (up to 8763 U) seen in 18/54 with schistosomiasis were traced to severe hematuria and/or pyuria in 12/18, and to early neoplastic changes in the bladder in 6/18. In 6 pts. with schistosomiasis associated with bladder cancer, LDH levels were 18,365-87,240 U. Urinary LDH was also studied in 4 pts. with other diseases of the urinary tract (pneumaturia of possibly malignant origin in 2/4; a history of hysterectomy for cancer of the uterus in 1/4; cancer of the rectum with senile prostate in 1/4), not associated with schistosomiasis. In 1/2 with

neumaturia (later traced to diverticulosis), the
rinary LDH value was within normal limits. The
ther 3 pts. showed elevated urinary LDH values
5430-7400 U), which was traced to malignant in-
iltration of the bladder. Measurement of uri-
ary LDH values is recommended for pts. with
chistosomiasis whenever malignant transformation
s suspected.

9-2172 COEXISTENCE OF CANCER AND CROHN'S DISEASE OF THE COLON. (Fr.) Lagache,
. (City Hosp., Lille, France), J. Paris and A.
upont. Acta Chir. Belg. 67(9):939-949, 1968.

67-yr.-old woman with carcinoma of the ileo-
ecal valve and regional enteritis (Crohn's
isease) involving the colon is described, bring-
ng the total number of recorded cases of this
ssociation of diseases to 20. The frequency of
ancer of the colon or rectum in pts. with Crohn's
isease is low (0.46% or 13/2989 pts. in 1 lit-
rature survey); the cancer frequency was higher
n pts. with Crohn's disease of the cecum or
olon than in pts. with the more prevalent enteri-
is of the jejunum and ileum. Most pts. devel-
ped cancer and enteritis in the same regions of
he intestine, but in some pts. (including the
uthors' case), the 2 diseases were separated by
segment of healthy colon. Because of the
arity of this association, it is concluded that
rohn's disease (unlike ulcerative colitis) can-
ot be considered as predisposing to cancer of
he colon or rectum.

9-2173 THREE CASES OF FAMILIAL CANCER (MALIGNANT DEGENERATION OF XERODERMA PIGMEN-
OSUM). (Fr.) Bessas, G. (19 Kycladon St.,
thens) and S. Michalas. Sem. Hop. Paris 45(14):
11-913, 1969.

hree brothers (age 52-56 yrs.) with xeroderma
igmentosum and areas of transformation to car-
inoma of the skin are described. Their father
ad died of a malignant tumor of the facial skin.
hese 3 pts. had pigmented cutaneous lesions of
he face and (in 1/3) hands of many yr. duration,
nd 1 brother reported intense sensitivity to
unlight. Two brothers were farmers; the other
as a chauffeur. They lived in an area where
he summers are long and hot, and about 300
ays/yr. are sunny.

9-2174 CYTOGENETIC FINDINGS IN ERYTHROLEUKEMIA. (E.) Heath, C. W., Jr. (Nat. Com. Dis.
tr., Atlanta, Ga.), J. M. Bennett, J. Whang-
eng, E. W. Berry and P. H. Wiernick. Blood
3(3):453-467, 1969.

hromosome morphology was studied in phytohemag-
lutinin-exposed bone marrow cultures from 10
ts. with erythroleukemia and 6 with "refractory
nemia" (showing clinical and/or hematological
signs suggestive but not diagnostic of underlying leukemia). Chromosomal abnormalities (aneuploidy, polyploidy and/or chromosomal breakage) were noted in cells from 9/16 pts., with patterns varying from 1 pt. to another. Some preparations contained hypodiploid or (less frequently) hyperdiploid cell lines, the result of chromosomal breakage and rearrangement. In 1 pt., "refractory anemia" progressed to frank acute granulocytic leukemia (AGL) 22 mo. after the cytogenetic abnormalities were noted. The results supported the hypothesis that erythroleukemia is basically a variant of AGL.

69-2175 HYPERPLASIA-INDUCING FACTOR IN MOUSE SALIVARY GLAND ISOGRAFTS. (E.) Hoshino, K. (U. West. Ontario, London, Canada) and C. D. LIN. Cancer Res. 28(12):2556-2558, 1968

The development of adenomatous or polycystic hyperplasia in i.p. implanted salivary gland isografts (submandibular, sublingual or parotid glands, implanted separately or all 3 glands together) was studied in several groups of BALB/c mice. In male mice bearing single salivary gland isografts from male donors, the only grafts becoming hyperplastic (examined after 30 days) were 4/20 parotid gland grafts. When all 3 salivary glands were transplanted, the results varied according to the sex of the donors and recipients: 2/3 grafts from males to males, 5/10 grafts from females to males, and 10/10 grafts from females to females, became hyperplastic, but all females with grafts from male donors died within 30 days. Which of the salivary gland grafts became hyperplastic was not clear. It is suggested that submandibular glands from female donors, implanted together with 2 other salivary glands, can become hyperplastic in either male or female recipients.

69-2176 A QUANTITATIVE METHOD FOR ASSESSMENT OF HEPATOCELLULAR LYSOSOMES - ITS APPLICATION TO NORMAL AND TUMOUR-BEARING ANIMALS. (E.) Parry, E. W. (U. Sheffield, England). J. Path. 97(1):155-156, 1969.

In 1 untreated rat and 1 rat that failed to develop a tumor despite the admin. of 7,12-dimethylbenzanthracene (DMBA), the livers showed a mean of 1.865 and 1.845 lysosomes/bile canaliculus, resp., showing that DMBA admin. alone did not increase the number of peribiliary hepatocellular lysosomes. In the liver of an animal with a carcinogen-induced s.c. sarcoma weighing 6 g, the number of lysosomes was significantly increased (mean, 4.885/bile canaliculus); an animal with a larger tumor (293 g) showed a further increase in the number of hepatocellular lysosomes (mean, 9.765/bile canaliculus).

69-2177 NUCLEOLAR RNA IN TUMOR CELLS. (Jap.) Muramatsu, M. (Cancer Inst., Tokyo). Saishin Igaku 23(3):480-491, 1968.

The principal components of nucleolar RNA from normal rat liver cells were the 45S, 38S and 28S fractions (45S RNA was believed to be a precursor of the other types). The uptake of 32P into rapidly labeling nucleolar RNA was studied in normal, regenerating or malignant rat liver cells. In all cell types, most label was taken up by 45S RNA after 15 min. of exposure. In hepatoma cells of rapid or slow growth rate (Walker and Morris hepatomas, resp.), the nucleolar RNA showed a higher guanylic acid content and a lower adenylic acid content than the normal or regenerating (rapidly growing) liver cells, showing that this factor did not depend on the growth rate of the cells. The ratio of the adenylic acid + uridylic acid content to the guanylic acid + cytidylic acid content of nucleolar RNA was about the same in all cell types (0.51-0.55).

69-2178 EFFECT OF ETHANOL EXPOSURE DURING EMBRYOGENESIS AND THE NEONATAL PERIOD ON THE INCIDENCE OF HEPATOMA IN C3H MALE MICE. (E.) Kahn, A. J. (VA Hosp., Hines, Ill.). Growth 32(4):311-316, 1968.

In several groups of male C3H mice exposed to ethanol (EtOH; 0.5% or 5.0% wt./vol. soln.), either throughout gestation or at age 1-2 wk., the hepatoma incidence at age 15 mo. was 14/111, about 33% of the spontaneous hepatoma incidence (27/62) in untreated controls. The hepatoma incidence was about the same in all treated groups, irrespective of the EtOH dosage or the age during treatment. Preliminary results of another experiment showed that admin. of 5.0% EtOH during adulthood (age 18-19 wk.) did not reduce the hepatoma incidence in male C3H mice. It is suggested that an EtOH-sensitive factor, of importance to the spontaneous development of hepatomas, is present in C3H mice during the embryonic and neonatal periods but not during adulthood.

69-2179 HISTOLOGICAL OBSERVATIONS OF CYSTICERCUS CYST WALLS OF THE LIVER OF RATS IN RELATION TO THE PRECANCEROUS STAGE IN THE WATANABE I TUMOR. (E.) Watanabe, F. (Nagasaki U. Sch. Med., Japan). Acta Med. Nagasaki. 12(3-4): 37-51, 1968.

Material consisting of 342 cysticercus cysts (almost all contained larval or adult Taenia crassicollis) from the livers of adult rats, was used to study the pathogenesis of the Watanabe I sarcomatoid ascites hepatoma (developed from the cysticercus cyst wall of a rat liver). These cysts were divided into 4 classes according to the degree of proliferation of their cellular components during the developmental stages (early stage, cell proliferation stage, thin-walled cysts, and fibrous and hyaloid cysts). All cysts frequently showed spindle-shaped liver cells in the inner layer of the wall; all of the fibroblasts, endothelial cells, bile duct epithelium, capillaries, and liver cell islands were supported by the fiber matrix of the wall. It is concluded that some hepatomas originate from the transformed liver cells in the cysticercus wall. A sarcomatoid hepatoma may be 1 of 2 tumors developing in the cyst after removal of the Taenia larvae.

69-2180 GENETIC MATERIALS OF CANCER CELLS AND CHANGES OF THE MEMBRANE SYSTEM. (Jap.) Oda, T. (Yokayama U. Sch. Med., Japan). Saishin Igaku 23(3):464-479, 1968.

Mitochondrial DNA (m-DNA) of the "ring" type from AH-130 rat hepatoma cells showed a greater variation in length than ring-type m-DNA from normal rat liver cells. A similar difference in ring-type m-DNA's was seen between normal human liver and human hepatoma cells. Mitochondria from rat liver and hepatoma cells contained an av. of 6 and 18 DNA molecules/mitochondrion, resp. A similar wide range in length of the ring-type m-DNA's was seen in mitochondria from a Rous sarcoma virus-induced mouse tumor and an adenovirus type 12-induced hamster tumor. In normal human liver cells, the ratio of ring to linear m-DNA was 1:1; in human hepatoma cells, ring-type m-DNA predominated, with ratios ranging from 1:1 to 2:1. Preimmunization with mitochondrial membranes from AH-130 cells protected 27/50 rats from subsequent development of this tumor (AH-130 cells were inoc. 14 days after immunization), but inoc. of nuclear, microsomal or plasma membranes from AH-130 cells had no protective effect.

69-2181 PROFILES OF TOTAL RIBONUCLEOPROTEIN PARTICLES FROM NORMAL RAT LIVER, PRIMARY LIVER TUMORS, AND NOVIKOFF HEPATOMA. (E.) De Lamirande, G. (U. Montreal, Canada) and D. J. S. Arora. Cancer Res. 29(4):795-799, 1969.

Ribonucleoprotein particles from primary rat hepatomas (induced by 6-7 mo. of feeding of 4-dimethylaminoazobenzene; 0.06% in diet) or transplanted rat hepatomas (7-day-old solid Novikoff hepatomas), showed a decrease in the proportions of monomers and dimers, with a shift towards a heavier population of polysomes. A similar alteration of the ribosomal population was observed in regenerating rat liver cells (obtained 24 or 36 hr. after partial hepatectomy).

69-2182 ACID HYDROLASE ACTIVITY DURING THE INDUCTION AND TRANSPLANTATION OF HEPATOMAS IN THE RAT. (E.) Kampschmidt, R. F. (Samuel Roberts Noble Found., Inc., Ardmore, Okla.) and D. Wells. Cancer Res. 29(5): 1028-1035, 1969.

n the livers of rats with hepatomas induced by 2 wk. of feeding 3'-methyl-4-dimethylaminoazo- enzene (3'-MDAB; 0.06% in diet), free and total ctivities of cathepsin, aryl sulfatase and β- alactosidase (but not acid phosphatase) in- reased significantly after 4 wk. of treatment. hese enzyme activities remained high until '-MDAB feeding was stopped, then declined. nzyme levels were about the same in liver and epatoma tissue of 3'-MDAB-fed rats. When these epatomas were serially transplanted (for 20-40 enerations), the enzyme activities decreased till further, especially the activities of athepsin and acid phosphatase. A similar pat- ern of enzyme changes was seen in the livers of ats fed thioacetamide (0.066% in diet) or α-naph- hyl isothiocyanate (0.08% in diet), but not in egenerating rat liver, or in the livers of rats ed the basal diet or 4'-methyl-4-dimethylamino- zobenzene (0.06% in diet). These changes in iver enzyme metabolism were attributed to de- truction of the hepatocytes and proliferation f the bile and/or littoral cells.

9-2183 ENDOMETRIAL SARCOMAS IN MICE: A SURVEY OF 130 CASES.

(E.) Chouroulinkov, . (Nat. Ctr. Sci. Res., Villejuif, France), .-C. Guillon and M. Guérin. J. Nat. Cancer nst. 42(4):593-603, 1969.

ndometrial sarcomas developed in 130 mice of everal strains, from several experimental groups sed for studies of skin or g.i. carcinogenesis. arcinogen admin. did not affect the frequency f endometrial sarcoma (4.55% in 1717 mice sur- iving 10 mo. after the beginning of the experi- ents). Endometrial sarcomas were more fre- uent in Swiss and ICI mice than in IC or 57BL/6 mice; they were also more frequent in 1 hybrid mice (especially mice of Swiss ances- ry) than in mice of the parent strains. Endo- etrial sarcomas were more frequent in isolated ice than in animals caged in groups of 10. solated mice weighed less than the mice caged n groups and showed behavioral disturbances aggressiveness and irritability), which were ttributed to pituitary-adrenal dysfunction.

9-2184 CHANGES IN DNA-BOUND AMINO ACIDS IN EXPERIMENTAL TUMOR TRANSPLANTS.

(E.) alser, J. S. (Sloan-Kettering Inst. Cancer es., New York, N. Y.), M. N. Teller and M. E. alis. Cancer Res. 29(5):1002-1007, 1969.

n 1 spontaneous bovine lymphosarcoma, a Rous irus-induced chicken sarcoma, and 5 induced at tumors (9,10-dimethylbenzanthracene-induced ammary tumor, and 4 fibrosarcomas induced by -hydroxyxanthine), total levels of DNA-bound mino acids were higher than in the tissues of rigin, but the relative conc. were sometimes the same as in the normal tissues. An unusual amino acid component, which was eluted from the ion exchange column at the same time as the aromatic amino acids, was seen in the DNA-bound amino acid component (but not in the cellular protein hydrolysates) of most of these tumors. This unusual compound apparently disappeared after several transplant generations. In 1 tumor studied for 25 transplant generations, changes in the DNA-bound amino acids (especially the unusual one) coincided with changes in tumor morphology.

69-2185 EFFECT OF CHICK EMBRYO EXTRACTS ON THE DEVELOPMENT OF EXPERIMENTAL TUMORS.

(It.) Giordano, F. (U. Milan, Italy) and A. Rasponi. Folia Hered. Path. (Milano) 17(3): 119-129, 1968.

In DBA mice inoc. s.c. with Cloudman s 91 melanoma, treatment with chick embryo extract enhanced tumor growth and reduced the median survival time. Females were somewhat less sensitive to this effect than males.

69-2186 COMPARISON OF SOLUBLE RNA METHYLASE CAPACITY IN PAIRED NEOPLASTIC AND NON-NEOPLASTIC CELL LINES IN VITRO.

(E.) Gantt, R. (NCI, Bethesda, Md.) and V. J. Evans. Cancer Res. 29(3):536-541, 1969.

Enzymatic methylation of RNA was studied in a long-term, non-neoplastic cell line of mouse embryo origin, in a neoplastic subline of this strain showing about the same growth rate (the presence or absence of neoplastic properties was determined by inoc. into syngeneic animals), and in cells of a transplantable tumor derived from another subline of cells, which showed a rapid growth rate and many mitoses (it was maintained by i.m. inoc. into irradiated syngeneic animals). The results indicated that the soluble RNA methylase enzymes of both neoplastic cell types had a greater capacity to search out sites for methylation than the control cells.

69-2187 CARCINOGENESIS IN TISSUE CULTURE. VIII. SPONTANEOUS MALIGNANT TRANSFORMATION OF RAT LIVER CELLS IN LONG-TERM CULTURE.

(E.) Sato, J. (Okayama U. Sch. Med., Japan), M. Namba, K. Usui and D. Nagano. Jap. J. Exp. Med. 38(2): 105-118, 1968.

Seven cell strains were established *in vitro*, from the livers of Donryu rats of 7 different ages (9-25 days). All strains became established after an av. of 200 days in culture, and showed morphological transformation after 237-1000 days of cultivation. At the time of back-transplantation, 2/7 strains were hypodiploid, 2/7 were triploid, 1/7 was hypotetraploid, 1/7 showed 2 modes (hypodiploid and hypotetraploid), and 1/7 showed a wide range of ploidy (hypotriploid to hexaploid). After i.p., s.c. or intracerebral inoc., 5/7 cell strains produced tumors (liver cell carcinoma with 1/5, sarcoma with 1/5, carcinosarcoma with 3/5 strains) in newborn Donryu rats.

69-2188 COMPARATIVE EFFECTS OF HORSE, CALF, AND FETAL SERUMS ON CHROMOSOMAL CHARACTERISTICS AND NEOPLASTIC CONVERSION OF MOUSE EMBRYO CELLS IN VITRO. (E.) Mitchell, J. T. (Upstate Med. Ctr., State U. New York, Syracuse), W. F. Andresen and V. J. Evans. J. Nat. Cancer Inst. 42(5):709-721, 1969.

Cells from C3H/HeN mouse embryos were cultivated for up to 260 days in NCTC 135 medium containing 5 different serum supplements (10% vol./vol.), then inoc. into C3H/HeN mice. Cells grown in fetal calf serum (FCS) showed a delay in the onset of both neoplastic conversion (into fibrosarcoma-producing cells) and the shift away from diploidy, as well as fewer chromosomal abnormalities, than cells grown in the other 4 sera (horse, calf, early fetal calf or fetal horse). Cells grown in all sera except FCS showed neoplastic conversion by day 235. The development of specific chromosomal abnormalities was not correlated with the onset of neoplastic conversion. Markers were more closely associated with adaptation to in vitro conditions than with tumor-producing capacity.

69-2189 GLUCOSE 6-PHOSPHATE DEHYDROGENASE ISOENZYME PATTERNS AND CHROMOSOMES IN PRIMARY LIVER TUMORS OF THE RAT. (E.) Hori, S. H. (Hokkaido U., Sapporo, Japan) and M. Sasaki. Cancer Res. 29(4):880-891, 1969.

In 25 hepatomas induced in male rats by 3 mo. of 3'-methyl-4-dimethylaminoazobenzene feeding (0.06% in diet), the changes observed in chromosome morphology and glucose-6-phosphate dehydrogenase isoenzyme patterns seemed to be independent of the initial neoplastic change.

69-2190 HYPERDIPLOIDY AND THE PHILADELPHIA CHROMOSOME (Ph^1) IN THE ACUTE TRANSFORMATION OF CHRONIC MYELOID LEUKEMIA. (Sp.) Prieto Garcia, F. (Inst. Cytol. Study, Valencia, Spain), G. Forteza Bover, R. Baguena Candela and F. Marco Orts. Sangre (Barc.) 13(4):433-448, 1968.

69-2191 CHROMATID MITOSIS IN CHROMOSOMES OBTAINED FROM THE SPLEENS OF LEUKEMIC MICE. (Sp.) Stockert, J. C. (Nat. Acad. Med., Buenos Aires). Sangre (Barc.) 13(4):449-453, 1968.

69-2192 CHROMOSOMAL ABNORMALITY, MEGALOBLASTOSIS, AND ARRESTED DNA SYNTHESIS IN ERYTHROLEUKAEMIA. (E.) Crossen, P. E. (Christchurch Hosp., New Zealand), P. H. Fitzgerald, R. C. Menzies and L. A. Brehaut. J. Med. Genet. 6(1):95-104, 1969.

69-2193 SEX CHROMATIN OF HYDATIDIFORM MOLES. (E.) Loke, Y. W. (U. Cambridge, England). J. Med. Genet. 6(1):22-25, 1969.

69-2194 SYSTEMIC SCLEROSIS ASSOCIATED WITH CARCINOMA OF THE LUNG. (E.) Tomkin, G. H. (Trinity Coll., Dublin). Brit. J. Derm. 81(3):213-216, 1969.

69-2195 CARCINOMA OF THE TERMINAL ILEUM AND SARCOIDOSIS IN A CASE OF ULCERATIVE COLITIS. (E.) Jalan, K. N., N. MacLean, J. M. Ross, W. Sircus (Western Gen. Hosp., Edinburgh, Scotland) and S. T. G. Butterworth. Gastroenterology 56(3):583-588, 1969.

69-2196 INDUCTION OF TUMORS BY IN VITRO TRANSFORMED MOUSE OVARIAN CELL CULTURES. (E.) Koprowska, I. (Hahnemann Med. Coll., Philadelphia, Pa.) and Hee-Yong Park. Proc. Amer. Ass. Cancer Res. 10:47, 1969.

69-2197 ULTRASTRUCTURAL CYTOCHEMISTRY OF INTRANUCLEAR PARTICLES OF HUMAN CANCER CELLS AS DETERMINED BY VARIOUS ENZYMATIC DIGESTIONS OF GLYCOLMETHACRYLATE EMBEDDED TISSUES. (E.) Lynn, J. A. (Baylor U. Med. Ctr., Dallas, Tex.), J. E. Carnes, G. J. Race and J. W. Finney. Proc. Amer. Ass. Cancer Res. 10:53, 1969.

69-2198 EFFECT OF HEMORRHAGIC SHOCK ON METASTASIS FORMATION. (E.) Madden, R. E. (New York Med. Coll., N. Y.) and L. Gyure. Proc. Amer. Ass. Cancer Res. 10:54, 1969.

AUTHOR INDEX

hmed, M. 2110
lbert, R. E. 2013
mbrose, K. R. 2091
mbrosioni, J. C. 2106
nchev, N. 2117
nderson, H. J. 2054
nderson, L. J. 2162
ndresen, W. F. 2188
ndrews, E. C. 2131
nkerst, J. 2088
rcos, J. C. 1999
rgus, M. F. 1999
rgyris, T. S. 2055
rhelger, R. B. 2131
rora, D. J. S. 2181
shley, D. J. B. 2121,2122
xelrod, D. 1993

abyak, M. A. 2011
aguena Candela, R. 2190
ajtai, A. 2006
ajwa, G. S. 2012
aker, H. W. 2010
alis, M. E. 2184
all, J. K. 2041
aron, S. 2086
artlett, G. C. 2124
aserga, R. 2045
assily, S. 2171
avetta, L. A. 2012
eard, J. W. 2082
ennett, D. E. 2131
ennett, J. M. 2174
ennett, P. 2013
ergeron, J. R. 2016
erndt, H. 2116,2132
ernhard, W. 2089
erry, E. W. 2174
essas, G. 2173
esznyák, I. 2006
ierwolf, D. 2001
lair, P. B. 2084
ock, F. G. 2023
odine, R. L. 2015
oreisha, I. 2047
orges, E. J. 2129
ourgeois, C. H. 2026
owie, M. 2068
oyd, J. T. 2127
oyland, E. 1989
ragg, K. 2128
raislovsky, C. 2089
reedis, C. 2098
rehaut, L. A. 2192
ryan, G. T. 2036
uu-Hoï, N. P. 2053
urns, F. 2013
utterworth, S. T. G. 2195

arleton, F. J. 2077
arnes, J. E. 2197
arvalho, R. P. S. 2146
assady, J. R. 2009

Chaklin, A. V. 2119,2163
Chang Won Song 2014
Chesterman, F. C. 2094
Chouroulinkov, I. 2183
Chubb, R. C. 2109
Churchill, A. E. 2109
Cleveland, J. C. 2048
Clifford, P. 2105
Cochran, A. J. 2007
Coggin, J. H., Jr. 2091
Cole, J. W. 2048
Connelly, R. R. 2151
Cooper, J. E. 2022
Corkill, A. G. L. 2018
Cornell, G. N. 2136
Crossen, P. E. 2192
Cutler, S. J. 2151

Dalldorf, G. 2146
Datta, B. 1990
Datta, R. K. 1990
Dawe, C. J. 1995
Dawson, D. A. 2041
Dayan, A. D. 2158
De Lamirande, G. 2181
Desai, P. B. 2129
De Séze, S. 2141
De-Thé, G. 2106
DeTreville, R. T. P. 2011
Dewhurst, F. 2060
DiGiacomo, R. 2090
DiPaolo, J. A. 2034
Dixon, R. A. 2148
Dodo, H. 2137
Doll, R. 2112,2127
Donovan, P. 2034
Do-Phuoc, Hien 2053
Drnková, V. 2134
Druet, P. 2141
Dryll, A. 2141
Dunn, J. E., Jr. 2150
Dupont, A. 2172
Dutcher, R. M. 2085
Dvoyrin, V. V. 2118

Ellsworth, R. M. 2009
Engle, G. C. 2085
Entin, S. D. 2005
Epstein, E. 2128
Erlich, D. 2146
Ershoff, B. H. 2012
Evans, C. A. 2097
Evans, V. J. 2186,2188

Fagan, P. A. 2003
Febles-Padron, D. 2126
Fefer, A. 2078
Fey, F. 2001
Field, J. B. 2012
Fields, L. A. 2074
Finney, J. W. 2197
Fischinger, P. J. 2080,2081
Fitzgerald, P. H. 2192
Flamant, R. 2123
Flesher, J. W. 2029
Foley, G. E. 1994
Forbes, W. F. 2021
Forteza Bover, G. 2190
Frank, H. K. 2000
Fraumeni, J. F., Jr. 2147,2154
Friberg, S., Jr. 2108
Frost, P. 2146

Gabriel, C. E. 2130
Gall, S. A. 2026
Gallagher, J. G. 2087
Gantt, R. 2186
Garbe, E. 2123
Garcia-Montelongo, R. 2126
Gardner, A. F. 1998
Gaugas, J. M. 2094
Gaughan, L. J. 2016
Georgescu, D. C. 2115
Gerber, P. 2107
Ghaffar, Y. A. 2171
Gilchrist, C. 2094
Giordano, F. 2185
Gisin, S. 2079
Glenn, F. 2136
Glynn, J. P. 2078
Goldin, A. 2074
Goldman, B. 2139
Goldstein, G. 2105
Good, R. A. 2042
Gould, W. M. 2008
Grace, J. T., Jr. 2104
Graffi, A. 2001
Green, M. 1992
Greenblatt, M. 2039
Gregor, O. 2134
Gross, P. 2011
Guérin, M. 2183
Guillon, J.-C. 2183
Gunz, F. W. 2143
Gyure, L. 2198

Hague-Nau, F. 2083
Halpern, B. L. 2078
Han, I. H. 2076
Haran-Ghera, N. 2072
Harman, J. W. 2062
Harvey, J. J. 2094
Heath, C. W., Jr. 2174
Hee-Yong Park 2196
Heimbach, R. 2013
Heine, U. 2082
Henle, G. 2101,2102
Henle, W. 2101,2102
Hengy, H. 2059
Herold, H. J. 2116
Hess, D. M. 2090
Hilbe, G. 2002
Hill, G. B. 2127
Hinds, J. R. 2125
Hinuma, Y. 2104
Hirsch, M. S. 2094

Hirschman, S. Z. 2080
Hitchcock, G. C. 2125
Ho, H. C. 2106
Hongo, J. 2165
Hori, S. H. 2189
Hoshino, K. 2175
Hozumi, M. 2031
Huebner, R. J. 2079
Huggins, C. 2033
Hussl, H. 2002

Imaizumi, T. 2067
Inoue, T. 2145
Irving, C. C. 2064
Ishikawa, S. 2137
Ito, Y. 2096
Iwata, R. 2165

Jackson, E. W. 2144
Jalan, K. N. 2195
Jamra, M. 2146
Jandová, A. 2155
Jeejeebhoy, H. F. 2095
Jellinck, P. H. 2028
Jensen, K. E. 2110
Johns, L. W. 2073
Johnson, A. G. 2076
Jones, D. G. 2130
Jordan, J. A. 2166
Jordan, S. W. 2157
Josey, W. E. 2099
Juhász, J. 2006
Julian, C. G. 2168

Kahn, A. J. 2178
Kahn, M.-F. 2141
Kajitani, T. 2137
Kampschmidt, R. F. 2182
Kaschak, M. 2011
Kaufman, R. J. 2068
Kese, G. 2169
Khoobyarian, N. 2087
Kinzel, V. 2065
Kirsch, N. 2017
Kirschstein, R. L. 2086
Kitchen, D. A. 2060
Klauber, M. R. 2144
Klein, E. 2108
Klein, G. 2105
Klein, K. 2132
Konn, M. 2104
Koprowska, I. 2196
Kramer, J. H. 2099
Kreider, J. W. 2098
Kurita, Y. 2037,2043
Kutschera, H. 2002
Kuznezova, L. E. 2035
Kwan, H. C. 2106

Lagache, G. 2172
Lamb, D. 2019
Langlois, A. J. 2082
Langvad, E. 2170
Lasnitzki, I. 2024
Lasserre, O. 2123
Layman, D. L. 2055
Leaver, D. D. 2049
Lemon, H. M. 2149
Lesko, S. A., Jr. 2032
Leuchtenberger, C. 2020
Leuchtenberger, R. 2020
Levin, A. G. 2108
Li, F. P. 2147
Lin, C. D. 2175
Linden, G. 2128
Lipworth, L. 2158
Lloyd, J. W. 2154
Loke, Y. W. 2193
Lower, G. M., Jr. 2036
Luthra, U. K. 2156
Lynch, G. A. 2152
Lynn, J. A. 2197

MacLean, N. 2195
Madden, R. E. 2198
Magee, P. N. 2049
Maguire, R. 2026
Majima, T. 2165
Mali, S. 2156
Mann, K. 2135
Manoilov, K. 2133
Mantel, N. 2142
Marco Orts, F. 2190
Marigo, C. 2146
Martinez-Palomo, A. 2089
Mass, N. 2138
Matsuyama, M. 2037,2044
Mayyasi, S. A. 2077
McCaffrey, R. M. 2164
McDonough, M. 2045
McKinnell, R. G. 2111
McSherry, C. K. 2136
Menzies, R. C. 2192
Meytes, D. 2139
Michalas, S. 2173
Michelson, S. F. 2083
Miluničová, A. 2155
Mitchell, B. S. 2139
Mitchell, J. T. 2188
Modan, B. 2138,2139
Mohr, U. 2065
Mohran, Y. 2171
Mokuno, J. 2145
Monov, N. 2117
Monroe, J. H. 2077
Montagnier, L. 2093
Montgomery, P. O'B. 2030
Moon, R. C. 2025
Moore, C. O. 2081
Moorhead, P. S. 1991
Mugera, G. M. 2161
Mulay, A. S. 2054
Mullins, J. F. 2016
Munsick, R. A. 2157
Murakami, S. 2165
Muramatsu, M. 2177
Murphy, W. H. 2076
Myers, R. E. 2090

Nagano, D. 2187
Nahmias, A. J. 2099
Naib, Z. M. 2099
Nakahara, W. 2070
Nakamura, T. 2044
Namba, M. 2187
Nderito, P. 2161
Neal, J. 2050
Nelson, R. 2034
Neumann, G. 2140
Newman, W. C. 2025
Niitsuma, A. 2038
Nishiyama, H. 2145
Nishizuka, Y. 2037,2043
Norris, F. D. 2144
Novelli, G. D. 2061

O'Connor, T. E. 2080,2081
Oda, T. 2180
O'Gara, R. W. 2054
O'Hegarty, M. T. 2062
Okano, T. 2038
Opler, S. R. 2069
Orlova, L. V. 2163
Ortwerth, B. J. 2061
Osato, T. 2096
Ouzounov, N. 2117

Paris, J. 2172
Parry, E. W. 2176
Pasternak, C. 2001
Pastorová, J. 2134
Pataki, J. 2033
Paul, J. S. 2030
Paymaster, J. C. 2129
Payne, L. N. 2109
Pearson, G. 2105
Pedersen, S. N. 2170
Peters, J. A. 2160
Pfitzer, E. A. 2011
Phillips, M. E. 2013
Pintér, E. 2006
Pitot, H. C. 2056,2057,2058
Poirier, L. A. 2056,2057,2058
Poirier, M. C. 2058
Ponomarkov, V. I. 2163
Popov, I. 2117
Preussmann, R. 2059
Prieto Garcia, F. 2190
Prušová, F. 2134
Purcell, R. H. 2107
Pylev, L. N. 2040

Rabbat, A. G. 2095
Race, G. J. 2197
Rapp, F. 2092
Rasponi, A. 2185
Ray, F. 2027
Recher, L. 2100
Rees, R. J. W. 2094

Reid, L. 2019
Reynolds, R. C. 2030
Rhim, J. S. 2079
Rich, M. A. 2073
Rigdon, R. H. 2050
Rijhsinghani, K. 2039
Riman, J. 2082
Roe, F. J. C. 2040
Rosenblum, E. N. 2107
Ross, C. F. 2018
Ross, J. M. 2195
Ryckewaert, A. 2141

Sagerman, R. H. 2009
Salser, J. S. 2184
Salzer, G. M. 2002
Sandberg, A. A. 1996
Sandison, A. T. 2162
Sasaki, M. 2189
Sasaki, T. 2045
Saslaw, L. D. 2054
Sato, J. 2187
Sayed, W. A. 2171
Sayenko, A. J. 2120
Schidlovsky, G. 2077,2110
Schoental, R. 2052
Schramm, T. 2001
Schricker, K. Th. 2135
Schüller, W. 2004
Schulz, H. 2004
Shah, K. V. 2090
Shani, M. 2139
Shapiro, S. 2153
Shibley, G. P. 2077
Shimkin, M. B. 2045
Shirahama, S. 2085
Shiratori, O. 2096
Shisa, H. 2037
Siegler, R. 2073
Singer, S. H. 2086
Sinkovics, J. G. 2100
Sircus, W. 2195
Sissons, H. A. 2127
Sivak, A. 2027
Sjögren, H. O. 2088
Škoda, V. 2155
Smith, E. M. 2154
Smith, G. 2028
Snyder, S. P. 2071
Sorheim, A. O. 2161
Spano, G. 2167
Stanton, M. 2021
Stark, C. R. 2142
Stedman, R. L. 2022,2023
Stock, C. C. 2068
Stockert, J. C. 2191
Stoker, T. A. M. 2051
Stone, R. S. 2157
Strax, P. 2153
Stutman, O. 2042
Sugiyama, T. 2043
Sulis, E. 2167
Süss, R. 2065
Suzuki, H. 2044
Swain, A. P. 2022,2023
Swann, P. F. 2049
Sydnor, K. L. 2029
Sykes, J. A. 2100
Szafarz, D. 2063

Tabachnick, J. 2014
Takadate, A. 2038
Takahashi, Y. 2165
Takano, A. 2137
Teller, M. N. 2068,2184
Tennekoon, G. E. 2124
Tevethia, S. S. 2092
Thatcher, D. 2045
Theilen, G. H. 2071
Thompson, J. R. 2005
Thomsen, J. J. 2097
Thomson, S. 2075
Tokuzen, R. 2070
Tolker, E. B. 2011
Toman, R. 2134
Tomkin, G. H. 2194
Toth, B. 2046,2047
Tretter, P. 2009
Ts'o, P. O. P. 2032
Tsuruta, R. 2037

Uekama, K. 2038
Umans, R. S. 2032
Usui, K. 2187
Vadlamudi, S. 2074
Vaďura, F. 2114
Van Duuren, B. L. 2027
Vdeyaratnam, G. 2159
Veale, A. M. O. 2143
Venet, L. 2153
Vesselinovitch, S. D. 2066
Vivancos-Gallego, G. 2126
Vohra, V. G. 2129
Volm, M. 2065
Von Hodenberg, A. 2059

Wagoner, J. K. 2154
Wahi, P. N. 2156
Waldorf, D. S. 2008
Walsh, J. H. 2107
Waravdekar, V. S. 2054,2074
Warwick, G. P. 2040
Wassef, S. A. 2171
Watanabe, F. 2179
Watson, J. 2011
Weisburger, J. H. 2063
Wells, D. 2182
Whang-Peng, J. 2174
Whitescarver, J. 2100
Wieder, R. 2045
Wiernick, P. H. 2174
Wildner, G. P. 2132
Willard, S. 2090
Wiseman, R., Jr. 2064
Wolf, G. 1999
Woodruff, J. D. 2168
Wright, B. S. 2077
Wunder, R. 2113
Wynder, E. L. 2137

Yamaguchi, J. 2104
Yohn, D. S. 2104
Yokoyama, Y. 2165
Yosida, T. H. 2037
Yunis, E. J. 2042

Zaccari, J. J. 2080
Zajac, B. A. 2101
Zambernard, J. 2111
Zippin, C. 1997
Zur Hausen, H. 2102

SUBJECT INDEX

ACETYLAMINOFLUORENE (See N-2-Fluorenylacetamide)
ADRENAL CORTEX
  toxicity, benzanthracene derivatives, rat: 2029,2033
AIR POLLUTION
  cancer incidence, France, study method: 2123
  lung cancer, Czechoslovakia: 2114
ALCOHOL
  ethyl, inhibition of spontaneous hepatoma, mouse: 2178
ALCOHOL CONSUMPTION
  cancer incidence, France, study method: 2123
  esophagus cancer, East Germany: 2132
AMINO ACIDS
  DNA-bound, spontaneous or induced animal tumors: 2184
ANTHRANILIC ACID, 3-HYDROXY- (tryptophan metabolite)
  mutagenesis, human embryo cells: 2035
ANTIBIOTICS
  phleomycin, effect on SV40 and other viruses, cell culture: 2092
ANTITUMOR AGENTS
  actinomycin D, interaction with methylcholanthrene, rat prostate _in vitro_: 2024
  cyclophosphamide, immunochemotherapy, Moloney virus lymphoma, mouse: 2078
  cytosine arabinoside, effect on Moloney sarcoma virus _in vitro_: 2080
  nitrogen mustard and its N-oxide, lung tumors, mouse: 2044, 2045
ARECAIDINE (See under Betel nut)
ARECOLIDINE (See under Betel nut)
ARECOLINE (See under Betel nut)
ASBESTOS
  particles, effect on benzpyrene retention by lung, hamster: 2040
AZOBENZENE, 4-DIMETHYLAMINO-
  hepatoma, effect of irradiated linolenic acid, rat: 2054
  properties of ribonucleoprotein particles, rat: 2181
AZOBENZENE,3'-METHYL-4-DIMETHYLAMINO-
  effect on nucleolus, rat liver: 2062
  hepatoma, chromosomes, rat: 2089
    enzymes, rat: 2182,2189
AZOBENZENE, 4'-METHYL-4-DIMETHYLAMINO-
  hepatoma, enzymes, rat: 2182
AZOBENZENE, N,N-DIMETHYL-2'-METHYL-4-AMINO-
  effect on liver amino acid-mobilizing enzymes, rat: 2057
AZOBENZENE, N,N-DIMETHYL-3'-METHYL-4-AMINO-
  effect on liver amino acid-mobilizing enzymes, rat: 2057

BENZ(a)ANTHRACENE DERIVATIVES
  structure-activity relationship, mammary tumors or sarcoma, rat: 2033
BENZANTHRACENE, 7,12-DIMETHYL-
  chromosome abnormalities, strain differences, mouse: 2037
BENZANTHRACENE, 7,12-DIMETHYL- (contd)
  derivatives, metabolic effects and toxicity, rat: 2029
  immunosuppression and toxicity, mouse: 2041
  leukemia, karyotype, rat: 2043
    strain differences, mouse: 2037
  lung tumors, X-irradiated rat or hamster: 2011
  lymphoma, mouse: 2041
  mammary tumors, DNA-bound amino acids, rat: 2184
    hormone effects, rat: 2068
  metabolism effect of other carcinogens, rat liver microsomes: 2028
  s.c. sarcoma, liver lysosomes, rat: 2176
  skin tumors, promotion by cigarette smoke, mouse: 2023
  thymoma, mouse: 2042
  transformation, tissue culture: 2034
BENZANTHRACENE,7-HYDROXYMETHYL-12-METHYL-
  metabolism, rat liver microsomes: 2028
1,2-BENZPYRENE
  chemical linkage to DNA, aqueous soln.: 2032
3,4-BENZPYRENE
  chemical linkage to DNA, aqueous soln.: 2032
  leukemia and lung or stomach tumors, mouse: 2050
  retention, lung, effect of particulate matter, hamster: 2040
  6-substituted derivatives, effect on liver zoxazolamine- and hexobarbital-mobilizing enzymes, rat: 2060
BETEL NUT
  alkaloids, carcinogenesis, review: 1989
  chewing, oral mucosa pathology, Ceylon: 2124
BLADDER CARCINOGENESIS
  xanthurenic acid 8-methyl ether, mechanism, mouse: 2036
BLADDER NEOPLASMS
  epidemiology
    cattle, Kenya, range plant species: 2161
    worldwide: 2112
  schistosomiasis, diagnosis, urinary LDH: 2171
BLOOD
  groups, ABO, stomach cancer and peptic ulcer: 2135
  haptoglobin type, female genital cancer, Czechoslovakia (Prague): 2155
BONE MARROW
  toxicity, dimethylbenzanthracene and derivatives rat: 2029
BONE NEOPLASMS
  epidemiology
    dogs, USSR (Moscow): 2163
    Great Britain: 2127
  osteosarcoma, complication of retinoblastoma radiotherapy, child: 2009
  tibial periosteum fibrosarcoma with skin carcinoma ("collision tumor"), unhealed varicose ulcer: 2004
BRAIN NEOPLASMS
  induction, elaiomycin, rat: 2052

RAIN NEOPLASMS (contd)
  medulloblastoma, neurofibromatosis with malignant transformation (neurogenic sarcoma) and radiation-induced thyroid cancer: 2018
REAST NEOPLASMS (See Mammary neoplasms, human)
RONCHUS
  tobacco smoke toxicity, rat: 2019

ARCINOGENS (CHEMICAL)
  fungal, foods, review: 2000
ARCINOGENESIS, CHEMICAL
  mechanism, review (book): 1999
  tobacco or betel nut alkaloids, animal, review: 1989
ELL GROWTH KINETICS
  normal rat liver or hepatoma, nucleolar RNA: 2177
  radiation-induced epidermal hyperplasia, guinea pig: 2014
ERVIX UTERI
  non-malignant lesions, contraceptives, human: 2026
ERVIX UTERI NEOPLASMS
  epidemiology
    Czechoslovakia: 2114
    Georgia (Atlanta), genital herpes virus infections: 2099
    India (Agra), ethnic groups: 2156
    methods: 2164,2165,2166
    New Mexico, American Indians: 2157
    New York City, ethnic groups: 2112
    regional variations, USSR: 2119
    worldwide: 2112
  idiopathic thrombocytopenia purpura, herpes-type virus particles: 2100
  LDH isoenzymes as index of malignancy: 2170
  Peutz-Jeger syndrome, possible radiation carcinogenesis: 2169
  premalignant, ethnic groups and occupation, Kirghiz SSR: 2120
HROMOSOMES
  carcinogen effects, strain differences, mouse: 2037
  cell lines, review: 1991
  chemically induced hepatoma, rat: 2189
  human leukemia: 2174,2190,2192
  mouse or rat leukemia: 2043,2191
  mutagenesis, tryptophan metabolites, human embryo cells: 2035
  sex, hydatidiform mole: 2193
OCARCINOGENESIS
  cigarette smoke + dimethylbenzanthracene, skin, mouse: 2023
OLON
  polyps, with colon/rectum cancer: 2136
OLON NEOPLASMS
  epidemiology
    East Germany, smoking: 2132
    Israel, ethnic groups: 2138
    Japan, environmental factors: 2137
  frequency of associated diseases: 2136
  induction, dimethylaminodiphenyl, effect of laxative, rat: 2048

COLON NEOPLASMS (contd)
  regional enteritis (Crohn's disease): 2172
CORPUS UTERI
  effect of methylcholanthrene, mouse: 2025
CORPUS UTERI NEOPLASMS
  endometrial sarcoma incidence, strain and environmental factors, mouse: 2183
  hydatidiform mole, sex chromatin: 2193
  induction, elaiomycin, rat: 2052
CROTON OIL
  phorbol esters, mechanism of action, normal or SV40-transformed cells: 2027

DIETARY FACTORS (See also under Foods)
  colon/rectum cancer, Japan: 2137
  effect on radiation carcinogenesis, mouse: 2012
  nutritional deficiencies, esophagus cancer, India: 2129
  stomach cancer, Czechoslovakia: 2134
DIPHENYL, 3:2'-DIMETHYL-4-AMINO-
  intestinal tumors, effect of laxative, rat: 2048
DISEASE TRANSMISSION
  possible, pets and their owners, USSR: 2163
DISTRIBUTION
  hydroxyfluorenylacetamide glucuronide, rat: 2064

ELAIOMYCIN (Streptomyces hepaticus)
  g.i., CNS and other tumors, rat: 2052
ENDOCRINE ABLATION (See also under Hormones)
  effect on dimethylbenzanthracene mammary tumors, rat: 2068
ENVIRONMENTAL FACTORS
  cancer epidemiology, regional variations, USSR: 2119,2120
  climate, skin cancer, Canary Islands (Tenerife): 2126
  g.i. cancer, East Germany: 1132
  isolation or crowding, endometrial sarcoma, mouse: 2183
  marital status, breast or female genital cancer, U.S.: 2150,2154
  seasonal variation of virus in frog kidney tumors: 2111
  seminoma of testis, urban-rural difference, England + Wales: 2158
ENZYMES
  amino acid-mobilizing, effect of carcinogens, rat liver: 2056,2057
  azo dye demethylase, effect of methylcholanthrene, rat liver: 2055
  carbohydrate- and lipid-mobilizing, effect of fluorenylacetamide, rat liver: 2058
  glucose-6-phosphate dehydrogenase deficiency, cancer incidence, Italy (Sardinia): 2167
  isoenzymes, chemically induced hepatoma, rat: 2189
  hexobarbital-mobilizing, effect of benzpyrene derivatives, rat liver: 2060

- ENZYMES (contd)
  - lactate dehydrogenase
    - diagnosis, schistosomiasis with malignant transformation: 2171
    - isoenzymes, as index of malignancy, cervix cancer: 2170
  - liver, chemically induced hepatoma, rat: 2182
  - menadione reductase and fluorenylacetamide hydroxylase, effect of dimethylbenzanthracene and derivatives, rat: 2029
  - RNA methylase, normal and tumor cells: 2186
  - zoxazolamine hydroxylase, effect of carcinogens, rat liver: 2053,2060
- EPIDEMIOLOGY
  - all tumors
    - alcoholism, air pollution and smoking, France: 2123
    - Bulgaria: 2117
    - domestic animals and their owners, USSR: 2163
    - East Germany: 2116
    - Italy (Sardinia), glucose-6-phosphate dehydrogenase deficiency: 2167
    - regional variations, USSR: 2119
    - registration methods, Romania: 2115
    - worldwide, sex difference: 2121,2122
  - bladder tumors, cattle, Kenya, range plant species: 2161
  - bone tumors, Great Britain: 2127
  - breast cancer
    - abnormal C18 and C19 excretion, review: 2149
    - calculation of relative risk, review: 1997
    - Czechoslovakia: 2114
    - England (southeastern): 2148
    - New York City: 2153
    - pregnancy, Northern Ireland: 2152
    - U.S.: 2150,2151
    - worldwide: 2113
  - Burkitt lymphoma, Brazil: 2146
  - cervix cancer
    - Czechoslovakia: 2114
    - Georgia (Atlanta), genital herpes virus infections: 2099
    - India (Agra), ethnic groups: 2156
    - methods: 2164,2165,2166
    - New Mexico, ethnic groups (American Indians): 2157
  - colon and rectum cancer
    - Israel, ethnic groups: 2138
    - Japan, environmental factors: 2137
  - esophagus cancer
    - East Germany, smoking and alcohol consumption: 2132
    - India: 2129
    - worldwide: 2112
  - female genital cancer
    - haptoglobin types, Czechoslovakia (Prague): 2155
    - marital status, U.S.: 2154
    - worldwide: 2113
  - 15 tumors, worldwide: 2112
- EPIDEMIOLOGY (contd)
  - gallbladder cancer, Texas (San Antonio), ethnic groups: 2131
  - g.i. cancer
    - East Germany: 2132
    - worldwide: 2113
  - Hodgkin's disease, children, U.S.: 2147
  - larynx cancer, children and adolescents, case and review: 2130
  - leukemia
    - birth order and maternal age, children, Michigan: 2142
    - Japan: 2145
    - rheumatoid arthritis and related diseases: 2141
    - siblings and other relatives, New Zealand: 2143
    - twins, children, California: 2144
    - West Germany: 2140
  - lung cancer
    - adenocarcinoma frequency, smoking: 2125
    - Czechoslovakia: 2114,2134
  - lymphoma, Israel, ethnic groups: 2139
  - melanoma prevalence: 2128
  - mastocytoma, genetic variations, dogs: 2160
  - mouth cancer, betel chewing, Ceylon: 2124
  - premalignant diseases, Kirghiz SSR: 2120
  - seminoma of testis, England and Wales, urban-rural difference: 2158
  - skin cancer, Canary Islands (Tenerife), climate: 2126
  - stomach cancer
    - ABO blood type, Germany: 2135
    - Bulgaria (Veliko Tirnovo district): 2133
    - Czechoslovakia: 2114,2134
  - testis tumors, Ceylon: 2159
  - thymus tumors, cattle, sheep and swine, Great Britain: 2162
- EPSTEIN-BARR VIRUS (See under Virus, herpes-type)
- ESOPHAGUS NEOPLASMS
  - epidemiology
    - East Germany, smoking and alcohol consumption: 2132
    - India: 2129
    - worldwide: 2112
- ETHIONINE
  - incorporation into transfer RNA, rat liver: 2061
- ETHNIC GROUPS
  - breast cancer, USSR: 2119
  - cervix cancer
    - India (Agra), Hindus and Moslems: 2156
    - U.S.: 2112,2157
    - USSR: 2119,2120
  - colon/rectum cancer, Israel: 2138
  - gallbladder cancer, Texas (San Antonio): 2131
  - g.i. cancer, USSR: 2119
  - Hodgkin's disease, children, U.S.: 2147
  - lymphoma, Israel: 2139
  - premalignant diseases, Kirghiz SSR: 2120
- EYE NEOPLASMS
  - retinoblastoma, risk of second tumor after radiotherapy: 2009

- TTY ACIDS
  - linolenic, UV-irradiated, effect on dimethylaminoazobenzene carcinogenesis, rat liver: 2054
- N'-(FLUOREN-2,7-YLENE)BISACETYLAMINE
  - liver tumor, tumor induction by RNA extract, mouse: 2067
- 2-FLUORENYLACETAMIDE
  - effect on
    - lipid- and carbohydrate-mobilizing enzymes, rat liver: 2058
    - liver enzymes, rat: 2056
- 2-FLUORENYLACETAMIDE, N-HYDROXY-
  - binding to DNA, rat liver: 2063
- 2-FLUORENYLACETAMIDE, N-HYDROXY-, GLUCURONIDE
  - metabolism, rat: 2064
- ODS (See also under Dietary factors)
  - fungal carcinogen contamination, review: 2000
  - trace elements, cancer incidence: 2118
- NGI
  - carcinogens, review: 2000

- LLBLADDER NEOPLASMS
  - epidemiology, Texas (San Antonio), ethnic groups: 2131
- STROINTESTINAL CARCINOGENESIS
  - benzpyrene, mouse: 2050
  - dimethylaminodiphenyl, effect of laxative, rat: 2048
  - elaiomycin, rat: 2052
  - nitrosomethylurea, rat: 2049
- STROINTESTINAL DISEASES
  - peptic ulcer, ABO blood type: 2135
  - Peutz-Jeger syndrome (intestinal polyposis), with cervix cancer, possible radiation carcinogenesis: 2169
  - regional enteritis (Crohn's disease), colon or rectum cancer frequency: 2172
  - ulcerative colitis, cancer of ileum and sarcoidosis: 2195
- STROINTESTINAL NEOPLASMS
  - epidemiology
    - regional variations, USSR: 2119
    - worldwide: 2112,2113
- NETICS, ANIMAL
  - canine mastocytoma, susceptibility, relationship to bulldog or English terrier: 2160
  - carcinogen-induced chromosome aberrations and leukemogenesis, strain differences, mouse: 2037
  - endometrial sarcoma incidence, strain differences, mouse: 2183
- NETICS, HUMAN
  - glucose-6-phosphate dehydrogenase deficiency, cancer incidence, Italy (Sardinia): 2167
  - haptoglobin types, female genital cancer, Czechoslovakia (Prague): 2155
  - leukemia in twins (children), California: 2144
  - neurofibromatosis, malignant transformation (neurogenic sarcoma), with brain tumor and radiation-induced thyroid cancer: 2018
  - Peutz-Jeger syndrome (intestinal polyposis) with cervix cancer, possible radiation carcinogenesis: 2169
- GENETICS, HUMAN (contd)
  - xeroderma pigmentosum with malignant transformation, sun exposure, brothers: 2173
- GENITAL NEOPLASMS, FEMALE
  - epidemiology
    - U. S., marital status: 2154
    - worldwide: 2113
  - haptoglobin types, Czechoslovakia (Prague): 2155
  - multifocal, method of spread: 2168
  - radiation induction, effect of dietary factors, mouse: 2012
- GUVACINE (See under Betel nut)

- HEMATOPOIESIS
  - erythropoiesis, effect of Friend leukemia virus, mouse: 2074
- HORMONES (See also under Endocrine ablation)
  - C18 and C19 steroids, excretion, breast cancer, review: 2149
  - contraceptive, cervix uteri lesions, human: 2026
  - cortisone, enhancement of tumor spread, rabbit: 2051
  - effect on virus-producing mouse mammary tumor *in vitro*: 2083
  - estrogens, effect on uterus, comparison to methylcholanthrene, mouse: 2025
  - metabolic status, breast cancer risk: 2150
    - endometrial sarcoma, mouse: 2183
  - sex, effect on dimethylbenzanthracene mammary tumors, rat: 2068
    - dimethylnitrosamine liver carcinogenesis, mouse: 2066
- HYDRAZINE SULFATE (isoniazid metabolite)
  - lung tumors, mouse: 2046
- HYDROCARBONS, POLYCYCLIC AROMATIC
  - relationship of carcinogenic and zoxazolamine hydroxylase-inducing effects, rat: 2053
  - transformation, tissue culture: 2034

- IMMUNITY
  - adenovirus-12 tumors, effect of BCG and allogeneic tumor cells, mouse: 2088
  - I_b leukemia, mouse: 2076
  - immunochemotherapy, Moloney virus lymphoma, mouse: 2078
  - radiation leukemia virus, mouse: 2072
  - polyoma virus tumors, effect of rat immune lymph node graft, mouse: 2095
  - Shope virus papilloma, rabbit: 2097
    - rat and hamster: 2098
  - SV40-induced hamster tumors: 2091
- IMMUNITY DISORDERS
  - rheumatoid arthritis, leukemia incidence: 2141
  - scleroderma, with lung cancer: 2194
- IMMUNOSUPPRESSION
  - anti-lymphocyte globulin, activation of polyoma virus, thymectomized mouse: 2094
  - dimethylbenzanthracene, mouse: 2041

- INJURIES (See also under Scar tissue)
  - burns, carcinoma of thumb, possible contact metastasis to ear: 2003
    - skin carcinoma: 2016
  - dentures, mouth cancer: 2015
  - hemorrhagic shock, effect on metastasis formation, rat: 2198
  - unhealed varicose ulcer, "collision tumor" (skin and periosteum): 2004
- INTERFERON
  - effect on human adenoviruses, tissue culture: 2087
- INTESTINE, SMALL, NEOPLASMS
  - ileum, with sarcoidosis and ulcerative colitis: 2195
  - induction, dimethylaminodiphenyl, effect of laxative, rat: 2048
- INTESTINE, LARGE, NEOPLASMS
  - epidemiology, U.S., marital status (nuns): 2154
  - induction, dimethylaminodiphenyl, effect of laxative, rat: 2048
- ISONICOTINIC ACID HYDRAZIDE
  - absence of carcinogenic effect, hamster: 2047
  - metabolite (hydrazine sulfate), lung tumors, mouse: 2046
- ISONIAZID (See Isonicotinic acid hydrazide)
- ISOTHIOCYANATE, α-NAPHTHYL-
  - hepatoma, enzymes, rat: 2182

- JAW NEOPLASMS
  - from odontogenic cyst, review: 1998
- JOINT DISEASES
  - leukemia incidence, rheumatoid arthritis and related diseases: 2141

- KIDNEY CARCINOGENESIS
  - elaiomycin, rat: 2052
  - nitrosomethylurea, rat: 2049
- KIDNEY NEOPLASMS
  - frog, seasonal variation of virus content: 2111
- KYNURENINE, 3-HYDROXY- (tryptophan metabolite)
  - mutagenesis, human embryo cells: 2035

- LARYNX NEOPLASMS
  - epidemiology, children and adolescents, case and review: 2130
- LAXATIVES
  - magnesium sulfate, effect on dimethylaminodiphenyl carcinogenesis, g.i. tract, rat: 2048
- LEUKEMIA, EXPERIMENTAL (See also under Virus, leukemia/lymphoma)
  - epidemiology, pets and owners, USSR: 2163
  - heterotransplanted or radiation-induced, chromosomes, mouse: 2191
  - L-1210 (mouse), effect on erythropoiesis: 2074
- LEUKEMIA, EXPERIMENTAL (contd)
  - line I_b, immunity, mouse strains: 2076
- LEUKEMIA, HUMAN
  - chronic myeloid, acute transformation, chromosomes: 2190
  - epidemiology
    - children, birth order and maternal age, Michigan: 2142
      - twins, California: 2144
    - Japan: 2145
    - pets and their owners, USSR: 2163
    - siblings and other relatives, New Zealand: 2143
    - West Germany: 2140
    - worldwide, adult: 2112
  - erythroleukemia, karyotype: 2174,2192
  - herpes-type virus antibodies: 2103,2104
    - particles: 2100
  - incidence, rheumatoid arthritis and related diseases: 2141
- LEUKEMOGENESIS
  - benzpyrene, mouse: 2050
  - dimethylbenzanthracene, mouse: 2037,2042
    - rat, chromosomes: 2043
  - elaiomycin, thymoma, rat: 2052
  - methylnitrosourethan, mouse: 2044
  - nitrogen mustard N-oxide, mouse: 2044
  - nitroquinoline-1-oxide, strain differences, mouse: 2037
  - urethan, mouse: 2037,2044
  - xanthurenic acid 8-methyl ether, mouse: 2036
- LEUKOSIS, BOVINE
  - spontaneous lymphosarcoma, DNA-bound amino acids: 2184
- LIVER
  - dealkylation of 1-aryl-3,3-dialkyltriazene carcinogens in vitro: 2059
  - DNA, hydroxyfluorenylacetamide binding, rat: 2063
  - enzymes, effect of carcinogens, rat: 2029, 2053,2055,2057,2058,2060,2182
  - lysosomes, tumor-bearing rat: 2176
  - microsomes, metabolism of benzanthracene derivatives, effect of methylcholanthrene, rat: 2028
  - nucleolus, effect of carcinogens, rat: 2062
  - transfer RNA, ethionine incorporation, rat: 2061
- LIVER CARCINOGENESIS
  - dimethylaminoazobenzene
    - effect of irradiated linolenic acid, rat: 2054
    - ribonucleoprotein particles, rat: 2181
  - dimethylnitrosamine, sex difference, mouse: 2066
  - elaiomycin, rat: 2052
  - methyldimethylaminoazobenzene
    - chromosomes, rat: 2189
    - enzymes, rat: 2182,2189
  - α-naphthylisothiocyanate, enzymes, rat: 2182
  - RNA from chemically induced hepatoma, mouse: 2067
  - thioacetamide, enzymes, rat: 2182
- LIVER DISEASES
  - Taenia infestation, transformation to hepatoma, rat: 2179

- VER NEOPLASMS
  - epidemiology, worldwide: 2112
  - mitochondrial DNA, rat and human: 2180
  - Novikoff hepatoma (rat), properties of ribonucleoprotein particles: 2181
  - rat hepatoma, cell growth rate and nucleolar RNA: 2177
  - spontaneous, ethanol inhibition, mouse: 2178
  - Watanabe I hepatoma, transformation from *Taenia* cyst, rat: 2179
- CITE (See under Plastics)
- NG
  - benzpyrene retention, effect of particulate matter, hamster: 2040
- NG CARCINOGENESIS
  - benzpyrene, mouse: 2050
  - dimethylbenzanthracene + X-rays, rat or hamster: 2011
  - isoniazid metabolite (hydrazine sulfate), mouse: 2046
  - methylcholanthrene, mouse: 2045
  - methylnitrosourethan, mouse: 2044
  - nitrogen mustard or its N-oxide, mouse: 2044, 2045
  - plastics, chondrosarcoma, human: 2005
  - urethan, hamster: 2047
    - mouse: 2044,2045
- NG DISEASES
  - TB
    - cancer on TB scars: 2006
    - plombage with plastic spheres, pulmonary chondrosarcoma, human: 2005
- NG NEOPLASMS
  - air pollution, Czechoslovakia: 2114
  - chondrosarcoma, foreign-body reaction to plastic spheres, human: 2005
  - epidemiology
    - Czechoslovakia: 2114,2134
    - worldwide: 2112
  - scleroderma: 2194
  - smoking
    - adenocarcinoma frequency: 2125
    - Czechoslovakia: 2114
  - TB scars: 2006
- MPHOMA, MALIGNANT, EXPERIMENTAL
  - epidemiology, thymic lymphosarcoma, cattle, sheep and swine, Great Britain: 2162
  - incidence, effect of isoniazid metabolite (hydrazine sulfate), mouse: 2046
  - mastocytoma, genetic susceptibility, dogs: 2160
  - radiation-induced, effect of dietary factors, mouse: 2012
- MPHOMA, MALIGNANT, HUMAN
  - Burkitt type, epidemiology, Brazil: 2146
  - epidemiology, Israel, ethnic groups: 2139
  - herpes-type virus antibodies: 2103,2104,2105
    - particles: 2104
  - Hodgkin's disease, epidemiology, children, U.S.: 2147
  - mycosis fungoides superimposed on photodermatosis: 2008

- LIGNANT TRANSFORMATION
  - mouse embryo cell culture, effect of culture medium: 2188
- MALIGNANT TRANSFORMATION (contd)
  - mouse ovary *in vitro*, sarcoma induction *in vivo*: 2197
  - neurofibromatosis to neurogenic sarcoma, with brain tumor and radiation-induced thyroid cancer: 2018
  - odontogenic cyst to carcinoma, review: 1998
  - possible, pulmonary scleroderma to lung cancer: 2194
  - schistosomiasis to bladder cancer, diagnosis, urinary LDH: 2171
  - spontaneous, rat liver cell culture: 2187
    - cell line, induction of ovary tumors, mouse: 2196
  - *Taenia* infestation to hepatoma, rat: 2179
  - ulcerative colitis or regional enteritis to intestinal cancer: 2172,2195
  - xeroderma pigmentosum to skin cancer, sun exposure, brothers: 2173
- MAMMARY CARCINOGENESIS
  - benzanthracene derivatives, structure-activity relationship, rat: 2033
  - dimethylbenzanthracene
    - DNA-bound amino acids, rat: 2184
    - hormone effects, rat: 2068
  - radiation, effect of dietary factors, mouse: 2012
    - virus-like particles, rat: 2085
- MAMMARY NEOPLASMS, EXPERIMENTAL (See also under Virus, mammary tumor)
  - epidemiology, dogs, USSR (Moscow): 2163
  - incidence, effect of isoniazid metabolite (hydrazine sulfate), mouse: 2046
  - radiation-induced, dietary factors, mouse: 2012
    - virus-like particles, rat: 2085
  - virus production, hormone effects *in vitro*, mouse: 2083
    - lactation, mouse: 2084
- MAMMARY NEOPLASMS, HUMAN
  - abnormal C18 and C19 steroid excretion, review: 2149
  - epidemiology
    - calculation of relative risk, review: 1997
    - Czechoslovakia: 2114
    - England (southeastern): 2148
    - identification of high-risk groups: 2150
    - New York City: 2153
    - Northern Ireland, pregnancy: 2152
    - U.S.: 2151
    - USSR, regional variations: 2119
    - worldwide: 2112,2113
  - premalignant diseases, epidemiology, Kirghiz SSR: 2120
- MAREK'S DISEASE
  - immunization, chicks: 2109
  - virus isolation and properties: 2110
- MAREK'S DISEASE VIRUS (See under Virus, herpes-type)
- 3-METHYLCHOLANTHRENE
  - anti-uterotropic effect, mouse: 2025
  - effect on
    - benzanthracene conversion, rat liver microsomes: 2028
    - liver enzymes and proliferation, rat: 2055
    - nucleolus, rat liver: 2062
    - rat prostate *in vitro*: 2024

3-METHYLCHOLANTHRENE (contd)
  lung tumors, DNA metabolism, mouse: 2045
  transformation, tissue culture: 2034
MINERALS
  trace elements (soil, water, food), cancer incidence: 2118
MOUTH
  mucosa, pathology, betel chewing, Ceylon: 2124
MOUTH NEOPLASMS
  poorly fitting dentures: 2015
  smoking, glucose-6-phosphate dehydrogenase deficiency, Italy (Sardinia): 2167
MUTAGENESIS
  tryptophan metabolites (3-hydroxykynurenine or 3-hydroxyanthranilic acid), human embryo cells: 2035

NASOPHARYNX
  epithelium, toxicity, nitrosamine derivatives, hamster: 2039
NASOPHARYNX NEOPLASMS
  EB virus particles: 2106
  postnasal space carcinoma, serum EB virus antibodies: 2105
NEOPLASMS, EXPERIMENTAL
  adenovirus 12- or Rous sarcoma virus-induced, effect on adenovirus 12-induced tumors, mouse: 2088
  Cloudman S-91 melanoma (mouse), enhancement, chick embryo extract: 2185
  DNA and RNA methylation, review: 1990
  epidemiology, domestic animals and their owners, USSR: 2163
  metastases, effect of hemorrhagic shock, rat: 2198
  mitochondrial DNA: 2180
  mouse embryo cell culture, effect of culture medium on transformation: 2188
  sarcoma, induction, *in vitro* transformed mouse ovary cells, mouse: 2197
  spontaneous fibrosarcoma, cat, virus isolation and transmission: 2071
  transformed rat liver cell culture: 2187
  Vx2 carcinoma (rabbit), cortisone- and exercise-induced dissemination: 2051
NEOPLASMS, HUMAN
  DNA and RNA methylation, review: 1990
  double or multiple primary, with colon/rectum cancer: 2136
  epidemiology
    Bulgaria: 2117
    East Germany: 2116
    France, alcoholism, air pollution and smoking: 2123
    methods, Romania: 2115
    trace elements in soil, water and food: 2118
    USSR: 2119
    worldwide: 2112
      sex difference: 2121,2122
  serum herpes-type virus antibodies: 2104
NICOTINE (See also under Tobacco)
  possible carcinogenesis, review: 1989
NITROGEN MUSTARD (See under Antitumor agents)
4-NITROQUINOLINE-1-OXIDE
  charge transfer reaction with DNA: 2038
  chromosome abnormalities and leukemogenesis, strain differences, mouse: 2037
  effect on RNA, mechanism, tumor cells: 2030
  metabolite (4-hydroxyaminoquinoline 1-oxide), mechanism of action, aqueous soln.: 2031
NITROSAMINE, DIETHYL-
  inactivation of tissue-specific inhibitors *in vitro*: 2065
  toxicity, nasal epithelium, hamster: 2039
NITROSAMINE, DIMETHYL-
  liver tumors, sex difference, mouse: 2066
  toxicity, nasal epithelium, hamster: 2039
N-NITROSO-N-METHYLUREA
  kidney, g.i., skin and other tumors, rat: 2049
N-NITROSOURETHAN, N-METHYL-
  lung and other tumors, mouse: 2044
NUCLEIC ACIDS, DNA
  amino acid binding, spontaneous or induced animal tumors: 2184
  carcinogen-induced lung tumors, mouse: 2045
  charge transfer reaction with carcinogenic or non-carcinogenic quinolines: 2038
  chemical linkage to benzpyrene, aqueous soln.: 2032
  effect of 1-aryl-3,3-dialkyltriazene carcinogens, mechanism: 2059
    carcinogen-bound rat liver proteins *in vitro*: 2065
  hydroxyfluorenylacetamide binding, rat liver: 2063
  methylation, tumor cells, review: 1990
  mitochondrial, comparison, normal and tumor cells: 2180
NUCLEIC ACIDS, RNA
  effect of
    1-aryl-3,3-dialkyltriazene carcinogens, mechanism: 2059
    methylcholanthrene and actinomycin, rat prostate: 2024
    nitroquinoline-N-oxide, tumor cells: 2030
  from induced hepatoma, induction of hepatoma, mouse: 2067
  methylation, normal and tumor cells: 2186
    tumor cells, review: 1990
  nucleolar, slowly or rapidly growing rat liver or hepatoma: 2177
  ribonucleoprotein particles, properties, rat hepatoma: 2181
  transfer, ethionine incorporation, rat liver: 2061
NUCLEOLUS
  liver, effect of carcinogens, rat: 2062

OCCUPATIONAL DISEASES
  tobacco and cotton cultivation, premalignant cervix diseases, Kirghiz SSR: 2120
OVARY
  malignant transformation *in vitro*, sarcoma induction *in vivo*, mouse: 2197

RY NEOPLASMS
 nduction, spontaneously transformed cell line, mouse: 2196

ASITIC DISEASES
 chistosomiasis, malignant transformation (bladder cancer), diagnosis, urinary LDH: 2171
 aenia liver cyst, transformation to hepatoma, rat: 2179
RBOL ESTERS (See under Croton oil)
ITS
 ange species, bladder tumors, cattle, Kenya: 2161
STICS
 olymethylmethacrylate (lucite), foreign-body reaction, chondrosarcoma of lung, human: 2005
GNANCY
 ith breast cancer, Northern Ireland: 2152
STATE
 effect of methylcholanthrene and actinomycin *in vitro*, rat: 2024
STATE NEOPLASMS
 epidemiology, worldwide: 2112

NOLINE DERIVATIVES
 charge transfer reaction with DNA as index of carcinogenic effect: 2038
NOLINE, 4-HYDROXYAMINO-, 1-OXIDE
 mechanism of action, aqueous soln.: 2031

IATION
 epidermal hyperplasia, cell growth kinetics, guinea pig: 2014
 sensitivity (photodermatosis), with mycosis fungoides: 2008
 sunlight, melanoma, prognosis: 2007
IATION CARCINOGENESIS
 effect of dietary composition, mouse: 2012
 lung, effect of dimethylbenzanthracene, rat or hamster: 2011
 mammary gland, virus-like particles, rat: 2085
 possible, benign facial tumor with Peutz-Jeger syndrome and cervix cancer: 2169
 risk, retinoblastoma treated with radictherapy, children: 2009
 skin
   pathogenesis, rat: 2013
   sunlight, xeroderma pigmentosum with cancer, brothers: 2173
 thyroid, adult: 2010
   neurofibromatosis with malignant transformation (neurogenic sarcoma) and brain tumor: 2018
IATION LEUKEMOGENESIS
 effect of dietary factors, mouse: 2012
TUM NEOPLASMS
 epidemiology
   East Germany: 2132

RECTUM NEOPLASMS (contd)
 epidemiology (contd)
   Israel, ethnic groups: 2138
   Japan, environmental factors: 2137
 frequency of associated diseases: 2136
 regional enteritis (Crohn's disease): 2172

SALIVARY GLAND
 hyperplasia-inducing factor, bioassay, mouse: 2175
SARCOIDOSIS
 with ulcerative colitis and cancer of ileum: 2195
SCAR TISSUE (See also under Injuries)
 burns
   skin carcinoma: 2016
   thumb, carcinoma of thumb with possible contact metastasis to ear: 2003
 lung, foreign-body reaction to plastic, chondrosarcoma of lung, human: 2005
   TB, scar cancer frequency: 2006
 postgastrectomy gastric stump, cancer risk: 2002
 tattoo, melanoma: 2017
 unhealed varicose ulcer, "collision tumor" (skin and periosteum): 2004
SEX
 chromosomes, hydatidiform mole: 2193
 difference
   cancer incidence, worldwide: 2121,2122
   dimethylnitrosamine liver carcinogenesis, mouse: 2066
SKIN
 radiation-induced hyperplasia, cell growth kinetics, guinea pig: 2014
SKIN CARCINOGENESIS
 cigarette smoke + dimethylbenzanthracene, method, mouse: 2023
 nitrosomethylurea, rat: 2049
 radiation, pathogenesis, rat: 2013
 s.c. sarcoma
   benzanthracene derivatives, structure-activity relationship, rat: 2033
   dimethylbenzanthracene, liver lysosomes, rat: 2176
   elaiomycin, rat: 2052
   hydroxyxanthine, DNA-bound amino acids, rat: 2184
 sunlight, brothers with xeroderma pigmentosum: 2173
SKIN DISEASES
 familial xeroderma pigmentosum, malignant transformation, sun exposure, brothers: 2173
SKIN NEOPLASMS
 basal cell carcinoma, burn scar: 2016
 benign, cervix cancer as possible complication of radiotherapy, Peutz-Jeger syndrome: 2169
 brothers, xeroderma pigmentosum, sun exposure: 2173
 "collision tumor" with fibrosarcoma of periosteum, unhealed varicose ulcer: 2004
 epidemiology
   Canary Islands (Tenerife), climate: 2126
   dogs, USSR (Moscow): 2163

SKIN NEOPLASMS (contd)
  epidemiology (contd)
    regional variations, USSR: 2119
  melanoma, prevalence: 2128
    tattoo site: 2017
  mycosis fungoides, photodermatosis: 2008
  premalignant, epidemiology, Kirghiz SSR: 2120
  sun exposure, prognosis: 2007
  thumb (burn scar) and external ear, possible contact metastasis: 2003
SOIL
  trace elements, cancer incidence: 2118
STATOLON (interferon inducer)
  effect on mouse leukemia and sarcoma viruses *in vitro*: 2079
STOMACH DISEASES
  ulcer, cancer risk after partial gastrectomy: 2002
STOMACH NEOPLASMS
  ABO blood type: 2135
  epidemiology
    Bulgaria (Veliko Tirnovo district): 2133
    Czechoslovakia: 2114,2134
    East Germany: 2132
    worldwide: 2113
  induction, benzpyrene, mouse: 2050
  postgastrectomy gastric stump, incidence: 2002
  premalignant, epidemiology, Kirghiz SSR: 2120
Streptomyces hepaticus METABOLITE (elaiomycin)
  g.i., CNS and other tumors, rat: 2052
SURGERY
  open-heart, complications, serum herpes-type virus antibodies: 2107

TESTIS NEOPLASMS
  epidemiology, Ceylon: 2159
  seminoma, epidemiology, England + Wales, urban-rural difference: 2158
THIOACETAMIDE
  hepatoma, liver enzymes, rat: 2182
THYMUS NEOPLASMS
  epidemiology, cattle, sheep and swine, Great Britain: 2162
THYROID NEOPLASMS
  epidemiology, worldwide: 2112
  radiation-induced
    adult: 2010
    neurofibromatosis with malignant transformation (neurogenic sarcoma) and brain tumor: 2018
    risk, retinoblastoma, child: 2009
TOBACCO
  alkaloids, carcinogenesis, review: 1989
  chewing in betel quid, oral mucosa pathology, Ceylon: 2124
  cultivation, premalignant diseases of cervix, Kirghiz SSR: 2120
TOBACCO SMOKE
  analysis, U.S. and Canadian cigarettes: 2021
  condensates, method of preparation: 2022
  skin tumors, bioassay method, mouse: 2023
  toxicity, bronchial epithelium, rat: 2019
    mouse cell cultures: 2020
TOBACCO SMOKING
  cancer incidence, France, study method: 2123
  g.i. cancer, East Germany: 2132

TOBACCO SMOKING (contd)
  lung cancer: 2125
    Czechoslovakia: 2114
  palate cancer, glucose-6-phosphate dehydrogenase deficiency, Italy (Sardinia): 2167
TOXICITY
  benzanthracene and derivatives, rat: 2029,2033
  dimethylaminoazobenzene, liver, effect of irradiated linolenic acid, rat: 2054
  dimethylbenzanthracene, mouse: 2041
  dimethyl- or diethylnitrosamine, nasal epithelium, hamster: 2039
  lung carcinogens, mouse: 2045
  tobacco smoke, bronchus, rat: 2019
    mouse cell cultures: 2020
TRIAZENE DERIVATIVES
  1-aryl-3,3-dialkyl-, mechanism of action (CNS tumors), rat liver microsomes: 2059
TRYPTOPHAN METABOLITES (See also under Xanthurenic acid 3-methyl ether)
  chromosome breakage, human embryo cells: 2035
  metabolism, mouse: 2036

URETHAN
  chromosome abnormalities and leukemogenesis, strain differences, mouse: 2037
  lung tumors, hamster: 2047
    mouse: 2044,2045
UTERUS (See under Corpus uteri)

VACCINE
  BCG, effect on adenovirus 12-induced tumors, mouse: 2088
VIRAL CARCINOGENESIS
  latent viruses, detection methods, review: 1992,1993
  tissue culture-derived vaccines, human, review: 1994,1995,1996
VIRUS, ADENO-
  SV15 (simian), effect of phleomycin *in vitro*: 2092
  type 2, effect of interferon, human cells: 2087
  type 5, interference with RNA and DNA virus, hamster cells: 2086
  type 7, effect of interferon, human cells: 2087
  type 12
    effect of interferon, human cells: 2087
    inhibition, BCG and allogeneic tumor cells, mouse: 2088
    transformation, effect on cell surface, hamster cells: 2089
VIRUS, HERPES
  effect of phleomycin *in vitro*: 2092
  infection, genital, and cervix cancer, Georgia (Atlanta): 2099
VIRUS, HERPES-TYPE
  Epstein-Barr (human; Burkitt lymphoma)
    cancer of nasopharynx: 2106
    effect of herpes simplex virus, cell lines: 2102
      mumps virus, cell lines: 2101
  infection, incidence, Brazil: 2146

US, HERPES-TYPE (contd)
serum antibodies, human cancer: 2103,2104 2105
post-perfusion syndrome: 2107
surface immunoglobulins, xenotransplanted tumor (rat): 2108
Lucké (frog kidney tumor), seasonal variation: 2111
Marek's disease (chicken), immunization: 2109
isolation and properties: 2110
morphology, human leukemia or lymphoma: 2100
US, LEUKEMIA/LYMPHOMA
Friend (mouse)
effect on erythropoiesis: 2074
interaction with hematopoietic cells: 2075
Statolon effect *in vitro*: 2079
Gross (mouse), antigen, effect on immunity to I_b leukemia: 2076
guinea pig leukemia, p.o. transmission: 2069
MC29 (avian myelocytoma), effect on ultrastructure, chick embryo cells: 2082
Moloney (mouse)
immunochemotherapy: 2078
Moloney sarcoma complex, identification of helper virus, cell line: 2081
mouse
leukemia viruses, review: 2001
lymphocytic sarcoma, properties: 2070
radiation leukemia (mouse), host immunity: 2072
Rauscher (mouse)
effect of Statolon, rat embryo cells: 2079
properties of ether-extracted virus: 2077
Rich (mouse), pathogenesis: 2073
US, MAMMARY TUMOR
mouse
hormone effects, mouse mammary tumor *in vitro*: 2083
tumor development during lactation and virus isolation from milk: 2084
rat, Type C particles, radiation-induced mammary tumor: 2085
US, PAPOVA (papilloma-polyoma-vacuolating)
polyoma
activation, immunosuppression, mouse: 2094
immunization, mouse: 2095

VIRUS, PAPOVA (papilloma-polyoma-vacuolating) (contd)
purine requirements, transformed cells: 2093
Shope papilloma (rabbit)
host immunity: 2097
induction, low temperature, rabbit cell line: 2096
transformation, host resistance, rat and hamster: 2098
SV40
effect of phleomycin *in vitro*: 2092
infection, pathology, monkey: 2090
transformation, effect on cell surface, hamster cells: 2089
transplantation immunity, hamster: 2091
VIRUS, SARCOMA
cat fibrosarcoma, transmission and morphology, kitten or puppy: 2071
Moloney (mouse)
effect of cytosine arabinoside *in vitro*: 2080
Statolon *in vitro*: 2079
Moloney leukemia complex, identification of helper virus, cell line: 2081
Rous (chicken)
DNA-bound amino acids in tumor: 2184
purine requirements, transformed cells: 2093

WATER
trace elements, cancer incidence: 2118

XANTHINE, 3-HYDROXY-
fibrosarcoma, DNA-bound amino acids, rat: 2184
XANTHURENIC ACID 8-METHYL ETHER (tryptophan metabolite)
bladder and lymphoreticular tumors, mouse: 2036
metabolism, mouse: 2036

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF H.E.W.

THE LIBRARY OF THE
OCT 20 1969
UNIVERSITY OF ILLINOIS

DQ

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

9405
R

Vet. Med

OCTOBER 1969
Abstract Nos. 2199–2492

Vol. 7
No. 10

NOV 12 69

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

CARCINOGENESIS ABSTRACTS

Volume 7, Number 10
October, 1969

(Submitted for Publication
July, 1969)

Abstract Numbers
2199-2492

CONTENTS

UNIVERSITY OF ILLINOIS
NOV 1
LIBRARY

	Page
Review	427
Physical Carcinogenesis	430
Chemical Carcinogenesis	433
Viral Carcinogenesis	447
Epidemiology and Biometry	460
Miscellaneous	463
Author Index	i
Subject Index	v

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

VETERINARY MEDICINE
LIBRARY

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a na-
ional program of cooperative research in cancer, is establishing a means whereby information
n the field of carcinogenesis will be coordinated and made available. The information to be
ncluded will be obtained from the National Cancer Institute, other governmental agencies, and
on-governmental research institutions.

The issuing of *Carcinogenesis Abstracts* under the auspices of the National Cancer Insti-
ute will provide a central source for current abstracting of the carcinogenesis literature be-
ng published throughout the world. This will help facilitate an integrated and cooperative
rogram of investigation in this area. The growing number of publications in the area of car-
inogenesis makes imperative the availability of an appropriate abstracting service so that
nvestigators may be apprised of progress with a minimum of delay. It is our desire to provide
ne investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most
ecently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*
the journal is not covered by *Index Medicus*, then the abbreviations (with some modifications)
ound in *World Medical Periodicals*, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

min.	administered, administration	mg	milligram(s)
.	average	min.	minute(s)
	curie(s)	ml	milliliter(s)
	millicurie(s)	mm	millimeter(s)
	microcurie(s)	mo.	month(s)
	centimeter(s)	MTD	maximum tolerated dose
nc.	concentration	NIH	National Institutes of Health, USA
m	counts per minute	p.o.	orally
A	deoxyribonucleic acid	QO_2	oxygen quotient
ase	deoxyribonuclease	PFU	plaque forming unit
g.	for example	ppm	parts per million
U	focus forming unit	pt.(s)	patient(s)
i.	gastrointestinal	RBC	red blood cells (erythrocytes)
	gram(s)	RES	reticuloendothelial system
	microgram(s)	resp.	respectively
	hemoglobin	RNA	ribonucleic acid
a.	intra-arterial	RNase	ribonuclease
50	median infectious dose	soln.	solution
j.	injected, injection(s)	s.c.	subcutaneous
oc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
p.	intraperitoneal	x	times (e.g. x 3/wk.)
U.	international unit(s)	U	unit
v.	intravenous	UV	ultraviolet
	kilogram(s)	vol.	volume
50	median lethal dose	VA	Veterans Administration
	molar, mole(s)	wt.	weight
	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
	micromole(s)		
x.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

.	Afrikaans	E.	English	Hun.	Hungarian	Lith	Lithuanian	Ser.	Serbo-Croatian
.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
l.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
n.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
t.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

69-2199 Laboratory Aids in Diagnosis of Cancer. Hoch-Ligeti, C. Charles C. Thomas, Springfield, Ill., 1969. 123 pp., $9.50. (461 references)

The diagnostic values of chromosome studies and the immune mechanism are discussed in Chapters II (pp. 2-8) and IV (44-51), resp.

69-2200 Immunoglobulinopathies: Immunoglobulins, Immune Deficiency Syndromes, Multiple Myeloma and Related Disorders, Engle, Ralph L., Jr. and L. A. Wallis. Springfield. Ill., Charles C. Thomas, 1969; 270 pp., $17.50. (About 700 references)

Chapters 7, 8 and 9 of this book (pp. 126-217) discuss the "paraimmunoglobinopathies," including multiple myeloma, Waldenström's macroglobulinemia, H chain disease (probably a rare variant of multiple myeloma) and related diseases. The epidemiology of these diseases is discussed in Chapter 7 (pp. 126-142).

69-2201 Guidelines to Radiological Health, Rockville, Md., U.S. Dept. HEW, Public Health Service Publ. No. 999-RH-33, 1968; 173 pp. (124 references)

Experimental, clinical and epidemiologic studies of radiation injury, including radiation carcinogenesis, are presented.

69-2202 THE BIOLOGICAL ACTION OF IONIZING RADIATION. (E.) Pollard, E. C. Amer. Sci. 57(2):206-236, 1969. (19 references)

Effects of high-energy radiation on DNA synthesis, genetic transcription and DNA degradation are discussed.

69-2203 CLINICAL PROBLEMS IN RADIATION HEMATOLOGY. (Ger.) Bauer, R. (69 Schwab St., Tubingen, Germany). Arztliche Forsch. 23(4):139-146, 1969. (61 references)

Aspects of the radiation injury syndrome are discussed, with special emphasis on clinical hematology: long-term effects of Thorotrast radiography, effects of chronic radiation exposure (especially among radiologists), radiation-induced leukemias (in Hiroshima and Nagasaki especially), and acute radiation toxicity.

69-2204 PATHOGENETIC AND CRITICAL DISCUSSION OF TWO CASES OF CARCINOMA DEVELOPING IN BURN SCARS. (It.) Saviano, M. S. (U. Modena, Italy). Arch. Ital. Pat. Clin. Tumori 11(3-4):423-455, 1968. (68 references)

The pathogenesis, frequency and treatment of cancers developing in old burn scars or recent burn wounds (different mechanisms are apparently involved) are discussed. The discussion also includes case histories of 2 men with rapidly proliferating, ulcerating squamous cell carcinomas developing in old burn scars (of 26 yr. duration in both pts.).

69-2205 CIGARETTE SMOKING AND LUNG CANCER: A CONSIDERATION OF THIS RELATIONSHIP. (E.) Rigdon, R. H. (U. Texas Med. Br., Galveston). Southern Med. J. 62(2):232-235, 1969. (17 references)

Studies which question the relationship between smoking and lung cancer (especially several unsuccessful attempts to induce lung cancer in animals by inhalation or intratracheal inj. of cigarette smoke condensates) are discussed. It is concluded that the statistical relationship between smoking and lung cancer in man is not necessarily a cause-effect relationship.

69-2206 METHODOLOGICAL ASPECTS OF STUDIES OF CARCINOGENESIS AND TUMOR CHEMOTHERAPY. (Ger.) Schmähl, D. (Ger. Cancer Res. Ctr., Heidelberg, Germany). Planta Med. Suppl. to 1968:3-12, 1968. (11 references)

Precautions to be taken and procedures to be followed in designing and executing animal experimental studies are discussed.

69-2207 EFFECTS OF LSD ON CHROMOSOMES AND THE FETUS. (Fin.) Idänpään-Heikkilä, J. E. (Texas Med. Ctr., Houston). Duodecim 85(5):274-282, 1969. (44 references)

A causal relationship between the use of LSD and either fetal deformities or chromosomal anomalies in the offspring has not yet been demonstrated convincingly in man, although both in vitro and animal studies are sufficiently suggestive to warrant further investigation. A carcinogenic effect in the LSD user appears to be questionable, but has by no means been disproved (see CRA 7(3):#525, March 1969).

69-2208 MYCOTOXINS: A POSSIBLE CAUSE OF PRIMARY CARCINOMA OF THE LIVER. (E.) Alpert, M. E. (Massachusetts Gen. Hosp., Boston) and C. S. Davidson. Amer. J. Med. 46(3):325-329, 1969. (67 references)

The hepatotoxic and hepatocarcinogenic effects of the aflatoxins in animals are discussed. Indirect (though not conclusive) evidence implicating aflatoxin as a cause of primary hepatoma in certain parts of the world is also presented. It is pointed out that aflatoxin is only 1/7 of the toxic metabolites of Aspergillus flavus, and that many other toxic fungi have been isolated from human foods.

69-2209 TISSUE REACTION TO PLASTIC AND METAL IMPLANTS. (E.) Brown, D. E. (1100 W. Michigan St., Indianapolis, Ind). Arch. Otolaryng. (Chicago) 88(3):283-287, 1968. (10 references)

Carcinogenic and toxic effects of plastics and metals in animals (usually rats) are discussed, with particular reference to substances used for implants in the middle ear. A survey of available evidence suggested that sarcoma induction by polymers in rats depends on both a non-specific inflammatory reaction to the surface of the polymer, and (to a lesser extent) a biophysical-chemical reaction between the tissue and the polymer or impurities found in the polymer. The chemically inert polymers that cannot be wet with water have less tissue reactivity than the other polymers; however, they also cannot form tight bonds with the tissues. After a discussion of the toxic and carcinogenic effects of various metals (especially stainless steels of different compositions), it is concluded that ferrous alloys should be replaced by biologically and chemically inert platinum-iridium alloys.

69-2210 EFFECTS OF TUMOUR VIRUSES ON GROWTH REGULATION IN CULTURED CELLS. (E.) Stoker, M. G. P. (Imperial Cancer Res. Fund Lab., London). Lancet 1(7590):362-365, 1969. (25 references)

The anchorage dependence of normal cells, their interactions with tumor viruses (the sequence of events following infection with DNA-containing tumor viruses in "permissive" and "non-permissive" cells), viral genes and their function, and changes in cell growth regulation resulting from the presence of the viral genome are reviewed, and the phenomenon of "abortive transformation" is discussed. In BHK21 hamster cells, infection with polyoma virus resulted in 2 types of change, a temporary transformation and a stable transformation (stable inheritance of transformation). It is suggested that if the growth of an infecting DNA tumor virus is incomplete, the viral DNA may eventually disappear, and that the alteration in cell growth will continue until the relevant viral products are lost. However, if 1 or more molecules of viral DNA reach a site where they become stably associated with the host chromosomes, they will be perpetuated and the viral genes will maintain the transformed state.

69-2211 HOW DO VIRUSES CAUSE CANCER? NEW HORIZONS FOR RADIOLOGISTS LECTURE. (E.) Temin, H. M. (U. Wisconsin, Madison). Radiology 92(5):931-938, 1969. (36 references)

The mechanism of action of the RNA-containing oncogenic viruses is discussed, with particular reference to results obtained with avian sarcoma viruses.

69-2212 DOCUMENTATION AND CLASSIFICATION OF ONCOGENIC VIRUSES. (E.) Huebner, R. J. (NIH, Bethesda, Md.). Nat. Cancer Inst. Monogr. 29:319-326, 1968. (No references)

Methods of classification of oncogenic viruses containing DNA (pox, papova and adenoviruses) and RNA (avian and mouse leukosis-sarcoma myxoviruses) are discussed. One table shows the host specificity of the papovaviruses (papilloma, polyoma, SV40). Another table shows the similarity of the avian and mouse leukosis-sarcoma viruses in 12/13 respects (the exception being the transfer of the viral genome from non-producer sarcoma cells to normal cells without a helper virus, noted only with the avian viruses). The human adenoviruses with high, moderate and no oncogenic activity can be grouped according to DNA composition (including the guanine + cytosine content) and the types of T antigen and group-specific messenger RNA seen in transformed cells. The simian adenoviruses can be classified serologically according to the T and tumor antigens.

69-2213 VIRAL TRANSFORMATION OF CELLS FROM PERSONS AT HIGH RISK OF CANCER. (E.) Miller, R. W. (NCI, Bethesda, Md.) and G. J. Todaro. Lancet 1(7585):81-82, 1969. (21 references)

In vitro measurement of human fibroblast transformation after inoc. of oncogenic viruses is recommended for studies of persons in high-risk groups, such as persons with chromosomal disorders, inborn immunological defects, congenital hemihypertrophy or visceral cytomegaly, environmental exposures, and twins or parents of children with leukemia. The magnitude of the cancer risk seems to be related to the proportion of transformed cells. Genetic disorders such as G or E trisomy and Fanconi's anemia were associated with an increased susceptibility to transformation with SV40.

69-2214 THE STATE OF THE DNA OF POLYOMA VIRUS AND SV40 IN TRANSFORMED CELLS. (E.) Dulbecco, R. (Salk Inst. Biol. Stud., San Diego, Calif.). Cold Spr. Harb. Symp. Quant. Biol. 33:777-783, 1968. (33 references)

The current status of knowledge of the interactions between viral DNA and cellular DNA in SV40- or polyoma virus-transformed non-permissive cells is discussed, with particular reference to the similarities and differences of this interaction and bacterial lysogenization.

69-2215 OESTROGEN FRACTIONS DURING EARLY REPRODUCTIVE LIFE IN THE AETIOLOGY OF BREAST CANCER. (E.) Cole, P. (Harvard Sch. Pub. Health, Boston, Mass.) and B. MacMahon. Lancet 1(7595):604-606, 1969. (34 references)

It is suggested that the relative levels of the individual estrogen fractions (the ratio of estriol to estrone + estradiol) produced in the first approx. 10 yr. after puberty are important determinants of the lifetime breast cancer risk.

69-2216 THE ACCURACY OF MAMMOGRAPHY IN THE DIAGNOSIS OF BENIGN AND MALIGNANT DISEASE. (E.) Gold, R. H. (U. California Sch. Med., San Francisco). Oncology 23(2):159-163, 1969. (6 references)

The presence of large amounts of mammary fat, by enhancing mammographic contrasts, permits the detection of even small cancers. Since the amount of mammary fat increases with age, the diagnostic accuracy of mammography is greater in the older age groups than in younger women. Mammographic signs of malignancy (malignant-type calcifications, skin thickening, increased vascularity) are not infallible by themselves, but evaluation of clinical data and pathological studies by the radiologist can improve the accuracy of mammographic cancer detection.

69-2217 MORPHOLOGY AND INCIDENCE OF TUMORS IN CHILDHOOD. (Ger.) Theuring, F. (Med. Acad., Magdeburg, Germany). Deutsch. Gesundh. 24(2):49-53, 1969. (69 references)

Data from the U.S. and East Germany on the incidence rates for the most common childhood tumors are compared and discussed.

69-2218 TUMORS OF THE EXTRAHEPATIC BILIARY SYSTEM. (E.) Gray, G. F., Jr. and R. W. McDivitt. Pathology Annual 4:231-251, 1969. (72 references)

In a literature survey concerning tumors of the gallbladder and bile ducts, the epidemiology of these tumors and possible predisposing etiologic factors (particularly cholelithiasis) are discussed.

69-2219 BLOOD COAGULATION AND TUMOR METASTASES. (Ger.) Rieche, K. (Inst. Cancer Res., Ger. Acad. Sci., Berlin). Arch. Geschwulstforsch. 33(1):66-75, 1969. (80 references)

The experimental formation of metastases resulting from the seeding of cancer cells in the peripheral circulation is enhanced by the presence of coagulants and antifibrinolytics, and inhibited by the presence of fibrinolytics and anticoagulants. Although the phenomenon has not yet been fully confirmed in man, supplementation of cytostatic therapy by treatment with anticoagulant and/or fibrinolytic agents is recommended.

69-2220 VIRUSES AND CANCER. (E.) Milt, H. Ca 19(4):218-227, 1969. (70 references)

69-2221 LEUKEMIA AND VIRUSES: CURRENT CONCEPTS. (Fr.) Gentile, J. M. (Div. Clin. Sci., U. Sherbrooke, Quebec, Canada) and J. M. Pépin. Union Med. Canada 98(8):1335-1337, 1969. (5 references)

69-2222 UNKNOWN HERPES-TYPE VIRUS FOUND IN LEUKEMIA CELLS. (Jap.) Osato, Y. (Inst. Cancer Res., Hokkaido U. Sch. Med., Sapporo, Japan), K. Yamamoto and K. Sugawara. Shonika Rinsho (Jap. J. Pediat.) 22(2):152-157, 1969. (20 references)

69-2223 THE PROMINENT DUCT PATTERN AS AN INDICATOR OF CANCER RISK. (E.) Wolfe, J. N. (Hutzel Women's Hosp., Detroit, Mich.). Oncology 23(2):149-158, 1969. (5 references)

69-2224 CHROMOSOMAL CHANGES IN SEVERAL MALIGNANT HEMOPATHIES. (Sp.) Ferreyra, M. E. (Clin. Hosp., Charcas 3180, Buenos Aires, Argentina) and F. Dondo Lascano. Prensa Med. Argent. 56(4):148-163, 1969. (167 references)

69-2225 HEREDITY AND CANCER. (E.) Lynch, H. T. (Creighton U. Sch. Med., Omaha, Neb.). Nebraska Med. J. 54(5):298-299, 1969. (8 references)

69-2226 COLLAGEN DISEASES AND CANCER. (Por.) Mello, A. (Santa Casa Cent. Hosp., São Paulo, Brazil) and N. R. Mello. Arq. Hosp. Sta. Casa São Paulo 14(4):245-250, 1968. (23 references)

69-2227 POTENTIAL HAZARDS OF $^{14}CO_2$ IN THE BIOSPHERE. (E.) Joftes, D. L. (Cancer Res. Inst., New Eng. Deaconess Hosp., Boston, Mass.). S. Afr. Cancer Bull. 12(4):173-176, 1968.

Atmospheric $^{14}CO_2$ can enter the blood carbonate pool and become fixed in tissues. Two pathways of damage caused by ^{14}C incorporation into DNA, RNA or enzyme molecules are discussed: delivery of a high-intensity energy pulse to a small, sensitive vol. by the β particle resulting from the radioactive disintegration of ^{14}C; and/or disruption of the macromolecule (perhaps at a side chain) by the nitrogen resulting from ^{14}C decay. To study the mutagenic and carcinogenic effects of measured quantities of atmospheric $^{14}CO_2$, a sealed chamber (described in detail) was devised for experiments lasting about 70 days in mice. The levels of ^{14}C radioactivity tested (in earlier experiments, 3500 cpm/liter of air; in later experiments, specific activity was 10-fold higher) were much higher than the established permissible levels of atmospheric $^{14}CO_2$. In the exposed mice, the highest levels of ^{14}C were found in the fat; tissues with a high nuclear content (such as the spleen) contained about 67% as much label as the fat. Preliminary studies of meiotic divisions of mouse spermatogonia suggested that the currently established permissible dose levels of $^{14}CO_2$ are safe.

69-2228 THYROID FUNCTION AND TUMOR RESISTANCE IN RATS INJECTED WITH A MINIMALLY CARCINOGENIC DOSE OF STRONTIUM-90. (Rus.) Berezovskii, B. S. (Vet. Inst., Kazan, USSR). Vop. Onkol. 15(3):66-71, 1969.

Tumor resistance and thyroid function were studied in non-inbred white rats during the 210-day latent period following i.p. inj. of a minimally carcinogenic dose of ^{90}Sr (0.05 μC/g; 1 inj.). Host resistance to the development of 2 transplanted tumors (1 hepatoma, 1 ovarian tumor) was enhanced for 12 wk., then depressed in the next 16 wk. Thyroid function was below control levels in the first 8 wk., and above control levels at 18-30 wk. Thyroidectomy inhibited tumor growth. It is suggested that changes in thyroid function and tumor resistance were related to changes in pituitary-adrenocortical function.

69-2229 ROLE OF HOST FACTORS IN INDUCTION OF LEUKEMIA BY RADIATION AND VIRUS. (E.) Yokoro, K. (Hiroshima U., Japan) and T. Ito. Acta Path. Jap. 18(3):362-371, 1968.

In male RF/Jax mice, radiation induction of myeloid leukemia was enhanced by inoc. of the Gross or Moloney leukemia viruses, suggesting that the myeloid cells became susceptible to the viruses during the stage of radiation-induced enhanced proliferation. In several experiments in rats and "non-susceptible" mouse strains inoc. with the Friend or Rauscher leukemia viruses, the results suggested that these viruses could infect all types of hematopoietic cells (not the erythroid cells alone) under optimum conditions. In female ICR/JCL mice, i.p. inoc. of ^{90}Sr (1.0 μC/g) proved highly leukemogenic. A comparison of the different types of leukemia induced by ^{90}Sr and X-irradiation suggested that leukemic transformation of certain cells requires a direct as well as an indirect effect of radiation. Since 1 of the ^{90}Sr-induced leukemias and 1 of the X-ray-induced leukemias could be transmitted by cell-free preparations, it is suggested that irradiation may have enhanced the susceptibility of certain target cells to viral transformation.

69-2230 LEUKEMIA IN POLYCYTHEMIA VERA. RELATIONSHIP TO SPLENIC MYELOID METAPLASIA AND THERAPEUTIC RADIATION DOSE. (E.) Lawrence, J. H. (Donner Lab., U. California, Berkeley), H. S. Winchell and W. G. Donald. Ann. Intern. Med. 70(4):763-771, 1969.

Since 1940, 181 pts. treated with ^{32}P (alone or + X-rays) for polycythemia vera have been followed up until death. Splenic myeloid metaplasia and a syndrome resembling acute myeloid leukemia developed in 45/181 (25%) and 26/181 (14%), resp.; the acute leukemia frequency in the pts. with and without myeloid metaplasia was 16/45 (36%) and 10/136 (7%), resp. Although the over-all acute leukemia frequency in this pt. group was 20-40 times higher than the expected frequency in a normal population (exposed to similar radiation doses and with the same times at risk), the results suggested that myeloid metaplasia and acute leukemia represent further evolutionary stages of polycythemia vera, and that the acute leukemia incidence in ^{32}P-treated pts. reflects a prolonged survival time, rather than the radiation dosage admin.

69-2231 THE JOACHIMSTAL LUNG CANCER AFTER THE SECOND WORLD WAR. REPORT OF 55 CASES. (Ger.) Horáček, J. (Reg. Hosp., Karlovy Vary, Czechoslovakia). Z. Krebsforsch. 72(1):52-56, 1969.

Autopsy records of the Karlsbad Hospital for 1947-1966 (inclusive, the records for 1945 and 1946 were not evaluable) disclosed 74 cases of lung cancer among uranium miners in Joachimstal (Jáchymov, Czechoslovakia). The 55 cases seen in 1962-1966 (all males) had been exposed to uranium ores for 4-25 yr. (less than 11 yr. in over 50% of the group) and were 34-70 yr. old (av. 53.8 yr.). Small cell carcinomas were noted in 70% of the group. Only 1/55 was a nonsmoker, 1 was a pipe smoker, and the smoking abits of 7/55 were not determined; the other 6/55 were cigarette smokers, and at least 25/46 moked 20 or more cigarettes/day. These 55 ases were compared to an unspecified number of oachimstal uranium miners with lung cancer, seen n 1929-1938 (previously reported). By comparison o the earlier series, the author's cases showed shorter period of uranium exposure (less than 1 yr. in only 1 pt. in the earlier group), an lder av. age (49 yr. in the earlier group), and higher frequency of small cell carcinoma of he lung (57% in the earlier group).

9-2232 CARCINOMA OF THE LARYNX 3 YEARS AFTER IRRADIATION OF A SARCOMA OF THE LARYNX. Ger.) Wirth, G. Arch. Klin. Exp. Ohr. Nas. ehlkopfheilk. 191(2):744-748, 1968.

48-yr.-old man (who had smoked about 20 igarettes/day for 18 yr., but had stopped 17 yr. reviously) presented with a polymorphonuclear pindle cell sarcoma of the right side of the arynx. The pt. showed total tumor regression ollowing cesium irradiation (5320 r), but 3 yr. ater he developed a squamous cell carcinoma of he left side of the larynx.

9-2233 RADIATION-INDUCED SARCOMAS OF THE SKULL. (Ger.) Friedmann, G. (U. ologne, Germany) and O. Kleinsasser. trahlentherapie 137(1):33-37, 1969.

wo women who underwent surgery for brain tumors ependymoma or spongioblastoma), followed by eep radiation therapy (RT), developed fibroarcomas in the operative scars 9 or 11 yr. ater. Another woman, who underwent repeated urgery and RT over 9 yr. for recurrent ylindroma of the orbit, developed a metastasizing ibrosarcoma of the frontal bone 2 yr. after the ast course of RT. Another woman, who underwent urgery and intensive RT for a spindle cell arcoma of the nasal opening of the skull, eveloped a fibrosarcoma of the mandibular oramen (invading the pterygomaxillary fossa and rbit) 15 yr. later.

9-2234 SURGICAL TREATMENT OF LATE RADIATION LESIONS OF THE SKIN. (Ger.) Petres, . (U. Clin., Freiburg im Breisgau, Germany) and . Haasters. Aesthet. Med. (Berlin) 18(5): 09-114, 1969.

ne of the pts. described had received X-irradiaion (4440 r) for actinomycosis of the neck, 16 r. before developing an ulcerating prickle cell arcinoma in the irradiated area.

-2235 KERATOACANTHOMA. CLINICAL REPORT OF ONE CASE. (It.) Proto, S. (U. alermo, Italy) and B. Marchiolo. Ann. Ital. erm. Clin. Sper. 22(2):120-129, 1968.

A 65-yr.-old farmer with multiple keratoacanthomas on the back of 1 hand is described.

69-2236 PREMALIGNANT FIBROUS EPITHELIAL TUMORS OF THE SKIN (PINKUS TUMORS). (Dut.) Van Zwijndregt, H. A. (Fac. Med., Rotterdam, Netherlands). Nederl. T. Geneesk. 113(11): 482-488, 1969.

About 20 yr. after the first of several series of X-ray treatments for ankylosing spondylitis, a 45-yr.-old man presented with multiple basal cell carcinomas of the skin, including 3 of the lumbosacral region (2/3 arising in scar tissue from an operation for a herniated nucleus pulposus), accompanied by multiple small Pinkus tumors of the trunk. During a 4-yr. follow-up period the general condition showed little change, but 1 of the Pinkus tumors (from which a biopsy specimen had been taken) underwent transformation into a typical basal cell carcinoma.

69-2237 CERVICAL AND VAGINAL CHANGES INDUCED BY THE USE OF INTRAUTERINE CONTRACEPTIVE DEVICES. (Sp.) Mateos Cándano, M. (A.B.C. Hosp., Mexico, D.F.), A. Olmos Tapia and A. Rustrian Azamar. Ginec. Obstet. Mex. 25(149):319-322, 1969.

Papanicolaou smears were obtained from 100 women (aged 18-40 yr.) both before and 12, 24, and 36 mo. after beginning the use of an intrauterine contraceptive. None showed any evidence of development of a malignant lesion or of an increase of premalignant changes following the use of the device. Completely normal smears were found in 69/100 prior to inserting the device and in 80/100 after its prolonged use. Metaplasia, dysplasia or parakeratosis was noted in 17 pts. prior to insertion, but regressed in 17/17 after insertion. The favorable changes recorded were attributed to the necessity for periodic gynecological consultations.

69-2238 ATYPIA OF THE BRONCHIAL EPITHELIUM IN WIND INSTRUMENT PLAYERS AND IN SINGERS: A CYTOPATHOLOGIC STUDY. (E.) Plamenac, P. (U. Sarajevo, Yugoslavia) and A. Nikulin. Acta Cytol. (Balt.) 13(5):274-278, 1969.

Sputum specimens were obtained from 30 young musicians (28 men, 2 women; 7/30 were under 20, only 4/30 were over 40): 7 singers and 23 wind instrument players (trumpet, flute, saxophone or clarinet). Most were professional musicians; 10/30 had been performing for less than 3 yr., 15/30 for 3-10 yr., and 5/30 for over 10 yr. All were non-smokers, without signs of acute or chronic pulmonary disorders. Only 3/30 subjects showed no pathological changes in the sputum, while 6/30 showed "irritation forms." Specimens from the other 21 subjects showed squamous metaplasia; atypia was noted in 8/21 and "microbiopsy" changes in 3/21. The 21 subjects with squamous metaplasia included 7/10 who had been performing for less than 3 yr. (2/7 showed atypia) and 5/5 who had been performing for over 10 yr. (2/5 showed atypia). It is concluded that the increased strain on the respiratory tract produced by the increased air pressure (possibly also air vibration) attendant on singing and wind instrument playing, can cause irritation, proliferation and metaplasia of the respiratory epithelium, independent of other factors.

69-2239 CLINICAL AND PATHOLOGICAL STUDIES OF PULMONARY SCAR CARCINOMA, WITH PARTICULAR REFERENCE TO RADIOGRAPHIC APPEARANCE. (Jap.) Nara, K. (Keio U. Sch. Med., Tokyo). Nippon Kyobugeka Gakkai Zasshi (J. Jap. Ass. Thor. Surg.) 17(2):120-134, 1969.

Pathological and X-ray findings in 9 men and 6 women with scar cancers of the lung are described. Scar cancers accounted for about 24% of all lung cancers, and tended to be more frequent in females than in males. All of these tumors were adenocarcinomas. CNS and other distant metastases were frequently noted.

69-2240 ANALYSIS AND DISCUSSION OF GASTRIC STUMP CANCER. (Ger.) Huber, P. (U. Surg. Clin. Innsbruck, Austria) and H. Bösmüller. Bull. Soc. Int. Chir. 27(6):550-556, 1968.

Over a period of less than 8 yr., 79 pts. with cancer of the gastric stump (1-2 cases/mo.) were seen. In 72 pts., cancer was found 2-52 yr. after gastric resection for ulcer. It is concluded, however, that the late appearance of cancer is not related to gastric resection.

69-2241 CANCER OF THE ESOPHAGUS AND STENOSIS DUE TO SCARRING FROM CAUSTIC BURNS. (Fr.) Gaillard, J., M. Bouchayer and J. P. Haguenauer. J. Franc. Otorhinolaryng. 18(4): 221-224, 1969.

Three men with carcinoma of the esophagus, superimposed on areas of esophageal stenosis resulting from caustic burns, are described. All pts. had performed esophageal dilatation (ED) on themselves repeatedly. One pt. (who sustained the caustic burn at age 3 yr.) performed ED for the next 17 yr., at which time gastric perforation was noted; no further ED was performed during the next 30 yr., prior to the diagnosis of cancer. The other 2 pts. had performed ED on themselves ever since they had sustained the caustic burns (regularly for 29 yr. in 1/2; regularly for 16 yr. and intermittently for the next 23 yr. in 1/2). It is suggested that this repeated, self-inflicted traumatization was a major contributing factor to the development of cancer.

69-2242 COMPOUND NEVUS WITH MALIGNANT TRANSFORMATION AND BRAIN METASTASES. (Ger.) Bücher, H. O. (U. Heidelberg, Germany) and S. Sievers. Med. Welt. 20(7):372-374, 1969.

In a 40-yr.-old man, a compound nevus of long standing suddenly increased in size and acquired a dark-brown color, followed a few wk. later by the appearance of a bluish-black spot under the skin in the immediate neighborhood of the tumor. Following the development of brain metastases 6 yr. later, biopsy confirmed the degeneration of the nevus into a melanoblastoma, apparently in response to the repeated trauma inflicted upon it by the pt., who, at the time of the transformation of the lesion, had acquired the habit of rubbing it daily with a hard brush until it bled.

69-2243 CYTOGENETIC STUDY OF LYMPHOID LEUKEMOGENESIS IN ISOGENEIC AKR-T1ALD RADIATION CHIMERAS. (Fr.) Legrand, E. (Pasteur Lab., Inst. Radium, Paris) and J.-F. Duplan. C.R. Acad. Sci. [D] 268(24):2990-2992, 1969.

69-2244 TUMORS INDUCED BY THOROTRAST. SARCOMA OF MULTIPLE SITES. (Fr.) Mignot, J. (Beaujon Hosp., Clichy, France), J. Barge and M. T. Lozac'hmeur. Arch. Anat. Path. 16(4): 294-304, 1968.

See also abstract nos.: 2201,2202,2203,2204,2268

69-2245 CANCER: HIGH RISK FOR CHEMISTS. (E.) Chem. Engineering News 47(8):14-15, 1969.

From April, 1948-July, 1967, the deaths of 4644 members of the American Chemical Society (ACS) were announced in Chemical and Engineering News; 70.9% of these persons were described in their obituaries as chemists, chemical engineers or scientists. Death certificates for 3637 of these persons were examined by Dr. F.P. Li (NCI, Bethesda, Md.). In male ACS members aged 20-64 yr., malignant tumors caused 20.6% of all deaths (444 deaths in 1948-1967), compared to only 15.6% of all deaths among U.S. professional men (same age group) in 1950. Relative frequencies of various tumors in the ACS members and in the U.S. professional men (expressed as percentages of all deaths) were: g.i. and peritoneal tumors, 6.6% and 5.8%, resp. (1.7% and 0.9%, resp., for cancer of the pancreas); respiratory tract tumors, 3.4% and 3.0%, resp.; tumors of the urinary organs, 1.1% and 1.0%, resp.; leukemia and aleukemia, 1.5% and 1.0%, resp.; and lymphosarcoma and related diseases, 2.8% and 1.2%, resp. The differences between the ACS members and the U.S. professional men in the relative frequencies of all tumors, cancer of the pancreas and lymphosarcoma were statistically significant.

69-2246 SILICOSIS AND LUNG CANCER. (Ger.) Rüttner, J. R. (Canton Hosp., Zurich) and H. R. Heer. Schweiz. Med. Wschr. 99(8): 245-249, 1969.

Of 688 Swiss men (over 20 yr. of age) dying of silicosis between 1960-1967 (inclusive), 16 (2.33%) showed lung cancer at autopsy (including 1/4 with asbestosis), compared to 3.99% of all Swiss men over 20 who died during the same time interval. The age distribution among the silicotic pts. with lung cancer paralleled the age distribution among all Swiss males dying of lung cancer (except that there were no cases of lung cancer in silicotic men under 40 or over 69 yr. of age); the greatest frequency of both diseases was seen in the 50-59 yr. age group. Histological types of lung cancer among the men with silicosis included squamous cell carcinoma in 10/16, small cell carcinoma in 3/16, undifferentiated carcinoma in 2/16 and adenocarcinoma in 1/16. Extrapulmonary tumors seen in 26/688 (3.8%) with silicosis included cancer of the prostate (7/26), stomach (5/26), esophagus (3/26), or small intestine (2/26), malignant ymphoma (3/26), simultaneous carcinomas of the esophagus and tonsil (1/26), fibrosarcoma of the thigh (1/26), and 1 case each of cancer of the pharynx, pancreas, thyroid and gallbladder.

9-2247 ADENOCARCINOMA OF THE LUNG WITH CHRONIC MINERAL OIL PNEUMONIA. (E.) Bryan, C. S. (Vanderbilt U. Hosp., Nashville, Tenn.) and J. K. Boitnott. Amer. Rev. Resp. Dis. 99(2):272-274, 1969.

Autopsy examination of a 73-yr.-old woman with esophageal achalasia of 11 yr. duration, showed a focus of adenocarcinoma arising in an area of pulmonary scarring ("paraffinoma") caused by mineral oil. It is concluded that the occasional association of mineral oil pneumonia and lung cancer in man is not sufficient evidence to suggest a direct carcinogenic action of mineral oil, although the oil may indirectly contribute to subsequent cancer development by inducing pulmonary fibrosis.

69-2248 A CIGARETTE SMOKE DOSAGE APPARATUS FOR EXPERIMENTAL ANIMALS. (E.) Holma, B. (Karolinska Inst., Stockholm) and P.-Å. Hellström. Arch. Environ. Health (Chicago) 18(3):386-389, 1969.

An apparatus (particularly applicable to rabbits) for admin. of controlled dosages of cigarette smoke is described. An advantage of this construction is direct adaptation of the smoke dispensing apparatus to the mouth of the animal, minimizing the distance between the oral cavity and the cigarette. Parameters such as the duration of a puff, puff vol. the time between 2 successive puffs, the temperature of the ember, the number of puffs/cigarette, butt length and the type of smoke inhalation can be registered and regulated within certain limits (usually with a respirator attached). The effects of cigarette smoke, with or without simultaneous exposure to air pollutants, on lung clearance can be studied using this apparatus.

69-2249 VERY RAPID INCREASE OF PULMONARY ACID DEOXYRIBONUCLEASE ACTIVITY IN SWISS MICE FOLLOWING TREATMENT WITH 3,4-BENZPYRENE. (Fr.) Lesca, P. (Gustave Roussy Inst., Villejuif, France), D. Toutain and R. Truhaut. C.R. Acad. Sci. [D] (Paris) 268(8):1238-1240, 1969.

Newborn Swiss mice received a single s.c. inj. of 3,4-benzpyrene (1 mg in olive oil); pulmonary acid DNase activity was studied at ages 3-70 days. At age 3-9 days, mean DNase activity in the lung tissue was 27.2% greater than in untreated controls; at ages 10-35 days it was 81% greater than control levels, although no macroscopic or microscopic evidence of lung tumor formation was noted. At ages 42-67 days, DNase activity was 157% greater than control levels, and all but 1 of the treated mice showed 1 or more tumor nodules. The relationship between the observed increase in acid DNase activity and the process of lung carcinogenesis is discussed.

69-2250 LUNG TUMORS IN RATS TREATED WITH N-NITROSOHEPTAMETHYLENEIMINE AND N-NITROSOOCTAMETHYLENEIMINE. (E.) Lijinsky, W. (U. Nebraska Coll. Med., Omaha), L. Tomatis and C. E. M. Wenyon. Proc. Soc. Exp. Biol. Med. 130(3):945-949, 1969.

In male or female MRC rats admin. 50 or 200 mg/liter of either N-nitrosoheptamethyleneimine (NHMI) or N-nitrosooctamethyleneimine (NOMI) in the drinking water, the survival rates after 30 wk. were 1/40 with NHMI and 39/40 with NOMI. At the time of death, squamous cell carcinomas of the lung, esophageal tumors or tongue and soft palate tumors were seen in 19/40, 22/40 and 7/40 of the NHMI-treated rats, resp., and in 11/40, 27/40 and 9/40 of the NOMI-treated rats, resp. No dose-response relationship was evident. NOMI was a less potent carcinogen than NHMI (the earliest lung tumors occurred at 37 and 16 wk., resp.; the earliest esophageal tumors occurred at 33 and 7 wk., resp.).

69-2251 CARCINOGENIC ACTIVITY OF 3,3'-DICHLORO-4,4'-DIAMINODIPHENYLMETHANE IN RATS. (Ger.) Steinhoff, D. (Inst. Exp. Path., Farbenfabriken Bayer AG, Wuppertal-Elberfeld, Germany) and E. Grundmann. Naturwissenschaften 56(4):215-216, 1969.

In Strain II Wistar rats, p.o. or s.c. admin. of 3,3'-dichloro-4,4'-diaminodiphenylmethane (aqueous soln.), in doses as high as 5.0 g/kg, induced only mild toxic reactions; 10/10 animals survived the treatment. However, long-term feeding of this compound (total dose 27 g/kg) in a protein-impoverished diet to male and female rats, induced primary lung cancers of various histological types in 13/50 animals; 10/50 showed simultaneous lung and liver tumors, 1/50 showed simultaneous liver and mammary tumors, and 40/50 showed primary liver tumors alone (with lung and cerebral metastases in 2/40 and 1/40, resp.). Mean survival times were 565 days in males and 535 days in females.

69-2252 NATURE, CLASSIFICATION, AND NOMENCLATURE OF KIDNEY TUMORS INDUCED IN THE RAT BY DIMETHYLNITROSAMINE. (E.) Riopelle, J. L. (U. Montreal, Canada) and G. Jasmin. J. Nat. Cancer Inst. 42(4):643-662, 1969.

In over 1000 Sprague-Dawley and Wistar rats in several series, dimethylnitrosamine induced kidney tumors in about 75% of the rats that tolerated the dosages admin., irrespective of strain, age or sex. About 20-25% of these tumors were epithelial (adenomas or carcinomas), derived from hyperplastic nephrons (Class I). The other tumors were sarcomatoid (stromal) nephromas of 3 types (small-cell or mature; large-cell or immature; intermediate or maturing), apparently derived from the same line of interstitial cells (Class II); some tumors were complex stromal-epithelial nephromas (Class III).

69-2253 INDUCTION OF TRANSITIONAL CELL CARCINOMAS OF THE URINARY BLADDER IN MONKEYS FED 2-NAPHTHYLAMINE. (E.) Conzelman, G. M., Jr. (U. California Sch. Vet. Med., Davis), J. E. Moulton, L. E. Flanders III, K. Springer and D. W. Crout. J. Nat. Cancer Inst. 42(5): 825-836, 1969.

Of 24 rhesus monkeys (*Macaca mulatta*) treated p.o. with 2-naphthylamine (6.25-400.0 mg/kg/day) for up to 60 mo., 9/24 developed transitional cell carcinomas of the bladder (ranging from benign papilloma to invasive carcinoma); the earliest tumor developed at 33 mo. An apparent dose-response relationship was seen in most cases. Some animals showed multiple bladder lesions, including simultaneous papillomas, carcinomas *in situ* and invasive carcinomas.

69-2254 INDUCTION OF LIVER AND LUNG TUMOURS IN MICE BY 6-AMINOCHRYSENE ADMINISTERED DURING THE FIRST 3 DAYS OF LIFE. (E.) Roe, F. J. C. (Chester Beatty Res. Inst., London), R. L. Carter and S. Adamthwaite. Nature (London) 221(5185):1063-1064, 1969.

Swiss albino mice were treated with 6-aminochrysene (AC; 200 µg/day in peanut oil s.c.) on days 1, 2 and 3 of life. During the first 11 mo. of observation, 12/23 males and 5/23 females died; 12/12 males had hepatomas and 9/12 showed lung tumors, compared to 1/5 and 1/5, resp., of the females. Only 1 vehicle-treated control showed a hepatoma. This tumor-inducing capacity of AC in neonatal animals was in contrast to its tumor-inhibitory activity in older animals.

69-2255 FACTORS INFLUENCING THE INDUCTION OF TUMOURS OF THE URINARY BLADDER AND LIVER BY 2-ACETYLAMINOFLUORENE IN THE MOUSE. (E.) Wood, M. (Leeds Sch. Med., England). Europ. J. Cancer 5(1):41-47, 1969.

In IF and RIII mice treated with N-2-fluorenylacetamide (FAA; 2-acetylaminofluorene), the incidence of tumors of the bladder epithelium and liver depended on the strain and sex of the mice (the sex difference was reduced by oophorectomy or orchiectomy), the method of FAA admin. (by stomach tube or in the diet), and the presence or absence of a paraffin pellet in the bladder (implantation of the pellet enhanced bladder tumor development). The degree of epithelial hyperplasia seen in the early stages of FAA admin. was not correlated with the ultimate development of tumors.

69-2256 STUDY OF THE METHYLATION AND LACK OF DEAMINATION OF DEOXYRIBONUCLEIC ACID BY N-METHYL-N'-NITRO-N-NITROSOGUANIDINE. (E.) Craddock, V. M. (Med. Res. Coun. Lab., Carshalton, England). Biochem. J. 111(5): 615-620, 1969.

DNA labeled with ^{14}C in the purine residues was prepared from livers and small intestines of 11-17-mo.-old female rats treated with ^{14}C-formate (total 205 μC in 23 days) neonatally. This DNA was incubated with N-methyl-N'-nitro-N-nitrosoguanidine (pH 7.5) and analyzed for methylation and deamination reaction products. The products formed were 7-methylguanine, a small amount of 3-methyladenine and 1-methyladenine (after preliminary denaturation of DNA). Methylation was increased in the presence of cysteine. Neither xanthine nor hypoxanthine was formed, even at pH 5.5.

9-2257 A FLUORESCENCE MICROSCOPIC STUDY OF METHODOLOGIC EFFECTS ON THE INTRANUCLEAR DISTRIBUTION OF BENZO(α)PYRENE. (E.) Shires, T. K. (U. Wisconsin, Madison). Cancer Res. 29(6):1277-1287, 1969.

A large number of agents used in cell fixation and fractionation (including ethanol, osmium tetroxide, sucrose, citric acid and acetate) were evaluated for their effect on intranuclear 3,4-benzpyrene distribution. Fluorescence microscopy gave reliable qualitative but probably not quantitative information on the nuclear localization of polycyclic hydrocarbons.

9-2258 GENETIC EFFECTS OF POLYNUCLEAR HYDROCARBONS: INDUCTION OF MITOTIC GENE CONVERSION. (E.) Zimmermann, F. K. (U. Freiburg/Brsg., Germany). Z. Krebsforsch. 72(1):65-71, 1969.

In a cytoplasmic respiratory-deficient strain (D 4-RD) of Saccharomyces cerevisiae, mitotic gene conversion was observed with 7,12-dimethylbenzanthracene, but not with pyrene, 3,4-benzpyrene, 1,2-benzanthracene or 1:2,5:6-dibenzanthracene.

9-2259 A HOST-MEDIATED MICROBIAL ASSAY FOR THE DETECTION OF MUTAGENIC COMPOUNDS. (E.) Gabridge, M. G. (U.S. Dept. H.E.W., Washington, D.C.) and M. S. Legator. Proc. Soc. Exp. Biol. Med. 130(3):831-834, 1969.

In Swiss albino mice inoc. i.p. with histidine auxotrophs of Salmonella typhimurium, the mutagenic effects of N-methyl-N'-nitro-N-nitrosoguanidine, dimethylnitrosamine and streptozotocin (admin. i.m.) were demonstrated by the increased production of S. typhimurium prototrophs; 16 other compounds (including alkylating agents) were inactive in this respect.

9-2260 STUDIES OF A POSSIBLE MUTAGENIC ACTIVITY IN FUSEL OIL. (Ger.) Gibel, W. (Inst. Cancer Res., German Acad. Sci., Berlin), Kh. Lohs, G. P. Wildner, S. Wittbrodt, E. Geissler and H. Hilscher. Arch. Geschwulstforsch. 33(1):49-54, 1969.

When 1.0% fusel oil (FO) in physiologic saline was added to a saline suspension of 2 substrains of E. coli W3102 (for 35 min. at 37° C), the number of cells capable of reproduction was reduced 0.5 logs in substrain G70 (hcr$^+$) AB1157; and 1.75 logs in substrain G71 (hcr$^-$) AB1884. When the FO conc. was increased to 1.1%, the mean number of cells capable of reproduction (both substrains) was reduced 2.8 logs; conc. as low as 0.5% induced a significant degree of inactivation in both strains, as well as in E. coli 57. The spontaneous reversion rate of E. coli CA 274 lac$_{125}$ $^-$ try$^-$ to try$^+$ was doubled in the presence of grain FO (0.7%), suggesting a probable mutagenic effect. In 12-wk.-old male CBA mice, s.c. admin. of grain FO (2.5 ml/kg/day for 5 days) prior to mating with a total of 30 females, reduced the number of conceptions to 0/30-8/30 (compared to 13/15-18/20 in saline-treated controls), suggesting induction of a dominant lethal mutation of the spermatozoa. Similar results were seen when the male mice were treated p.o. with the same doses of FO.

69-2261 ON THE REVERSIBLE CHARACTER OF DELAYED MUTATIONS INDUCED BY NITROSOCOMPOUNDS IN Drosophila melanogaster. (E.) Ondřej, M. (Inst. Exp. Botany, Prague). Folia Biol. (Praha) 15(1):17-25, 1969.

Recessive lethal mutations were induced during the postmeiotic stage of spermatogenesis in Drosophila melanogaster by inj. with methylnitrosourethane or methylnitrosamine (0.5 x 10^{-2} M; 0.2 μl soln./fly). Mutation frequencies were about the same with both compounds; mosaicisms occurred in the F_3 generation and in all subsequent generations, and segregation of mosaics persisted up to F_6. Back mutations occurred with about the same frequency as forward mutations. These results indicated replication instability.

69-2262 EXPERIMENTAL INDUCTION OF DEFORMITIES IN SWINE FETUSES BY INTRAVENOUS ADMINISTRATION OF N-ETHYL-N-NITROSOUREA. (Ger.) Ehrentraut, W. (Karl Marx U., Leipzig, Germany), H. Juhls, G. Kupfer, M. Kupfer, J. Zintzsch, P. Rommel, M. Wähmer, U. Schnurrbusch and P. Möckel. Arch. Geschwulstforsch. 33(1):31-38, 1969.

When N-ethyl-N-nitrosourea was admin. i.v. to 4 young sows (6-12 doses of 20 or 30 mg/kg/day or every other day), starting on day 20-22 of gestation, 2/4 animals were lost to the study (1/2 died of intercurrent causes; 1/2 had a premature littering on day 85 of gestation). The piglets in the 2 remaining litters were born at term, and showed pulmonary deformities and cysts in the kidneys, pancreas, and salivary glands and their ducts, as well as varying degrees of hepatic parenchymal damage (ranging from vacuolar epithelial degeneration to extensive necrosis). All of the animals showed extensive skin nodules, consisting primarily of small adenomatous tumors and circumscribed benign fibroepithelial warts. Many of the animals were stillborn; the remainder were undersized, weak and short-lived. No stillbirths or abnormalities were noted among 2 control litters of sows treated with urea (6 doses of 100 mg/kg every other day, beginning on day 21 of pregnancy); both control litters were born at term.

69-2263 THE OCCURRENCE OF TUMOURS IN F$_1$, F$_2$, AND F$_3$ DESCENDANTS OF PREGNANT MICE INJECTED WITH 7,12-DIMETHYLBENZ(A)ANTHRACENE. (E.) Tomatis, L. (Int. Agency Res. Cancer, Lyon, France) and C. M. Goodall. Int. J. Cancer 4(2):219-225, 1969.

The offspring of 7,12-dimethylbenzanthracene (400 μg i.p. in the last days of pregnancy)-treated pregnant female MA mice showed an increased incidence of tumors in the female F$_1$, F$_2$, and F$_{2f}$ (F$_1$ females from treated mothers x F$_1$ males from untreated mothers) descendants: 53-67% of the females and 33-41% of the males compared to a frequency of 18% and 32% for female and male controls, resp. The av. age at death for the experimental animals was about the same as in controls with spontaneous tumors (83-92 wk.). Malignant lymphomas and tumors of the lung and ovary were more frequent in the F$_1$ and F$_2$ descendants of treated females than in controls. Many of the experimental animals developed relatively rare tumors (osteoma, osteosarcoma, carcinoma of the clitoris, s.c. sarcoma).

69-2264 ROLE OF ENDOCRINE IMBALANCE IN THE INDUCTION OF BRAIN TUMORS BY METHYLNITROSOUREA. (Rus.) Jänisch, W. A. (Med. Acad., Erfurt, Germany), R. Warzok and D. Schreiber. Biull. Eksp. Biol. Med. 67(1):64-66, 1969.

Intact and orchiectomized (orx.) male Wistar rats (100 g) were inj. with methylnitrosourea (MNU; 5 mg/kg). In the rats surviving 100 days after the beginning of the experiment, brain tumors were seen in 1/17 orx. rats and in 2/18 intact controls; tumors of the peripheral nerves were seen in 3/17 and 5/18, resp. It is concluded that the hormonal imbalance caused by orx. did not affect MNU induction of CNS tumors.

69-2265 EXPERIMENTAL NEUROGENIC TUMORS INDUCED IN RATS BY N-METHYL-N-NITROSOUREA. II. HISTOCHEMICAL ENZYME FINDINGS. (Ger.) Osske, G. (Path. Inst., Erfurt, Germany), W. Jänisch and D. Schreiber. Exp. Path. 3(2): 67-75, 1969.

In 29 neurosarcomas of the cranial and spinal nerves, induced in rats by N-methyl-N-nitrosourea (no other details), the activities of acid and alkaline phosphatase, arylesterase, leucine aminopeptidase, NADH tetrazolium reductase and succinic dehydrogenase (none of the tumors showed cytochrome oxidase activity) varied markedly from 1 tumor to another, and sometimes from cell to cell within the same tumor. The distribution of enzyme activities seemed to be correlated more to the metabolic activities of the tumor cells than to the malignancy of the tumors, although the distribution of acid phosphatase and arylesterase suggested the possibility that the tumors had been induced by products of myelin disintegration.

69-2266 STUDIES OF ORGANOTROPY IN THE CARCINOGENIC ACTIVITY OF N-METHYL-N-NITROSOUREA IN RATS. (Ger.) Thomas, C. (U. Freiburg im Bresgau, Germany) and R. Bollmann. Experientia 25(1):50-51, 1969.

In female Wistar rats treated p.o. with N-methyl-N-nitrosourea (MNU), the tumor induction times and the sites of the tumors depended on the dosage, the pH of the soln. and the age of the animals. In 3-mo.-old animals admin. 5 mg/kg/day (drinking water) of NMU soln. at pH 4.0, 6.0 and 7.0, tumors developed in 13/20, 12/20 and 20/20, resp.; most of these tumors were neurogenic. In 3-mo.-old rats admin. a single large dose of MNU (40 mg/kg) at pH 4.0, 6.0 or 7.0, tumors developed in 17/24, 10/24 and 18/24. At this dose a resorptive effect was noted, with a high frequency of mammary, kidney and forestomach tumors. In 48-day-old rats admin. the single high dose of MNU at pH 4.0, tumors developed in 18/24, predominantly tumors of the forestomach and kidney; 8 rats showed systemic tumors (leukemia, reticulosis, sarcomas) and 3/8 also developed primary tumors of the spleen.

69-2267 EXPERIMENTAL CARCINOGENESIS WITH MOLLUSKS. II. TRANSPLANT EXPERIMENTS WITH A CHEMICALLY INDUCED ADENOPAPILLOMA IN THE LA PLATA APPLE SNAIL, Ampullarius Australis d'Orbigny (Gastropoda, Prosobranchia). (Ger.) Krieg, K. (Inst. Comp. Path., German Acad. Sci., Berlin). Arch. Geschwulstforsch. 33(1):18-30, 1969.

Malignant, metastasizing adenopapillomas were induced in La Plata apple snails (shell diameter of 2.0-3.5 cm) by inj. of an oily soln. containing 3-methylcholanthrene (1.0%) + croton oil (0.2%) into the foot appendage. Three subsequent passages of the resulting tumor and/or metastases were made. In the first passage, 11/16 animals developed 4 benign and 3 malignant adenopapillomas and 4 adenomas or cystadenomas, with a mean latent period of 164 days. In the second passage, 13/80 animals developed 10 adenomas or cystadenomas, 1 malignant adenopapilloma, 1 papilloma, and 1 adenocarcinoma, with a mean latent period of 138 days. In the third passage, 5/72 animals developed 3 adenomas or cystadenomas and 2 papillomas, with a mean latency period of 258 days. In the first passage, 1 benign and 2 malignant adenopapillomas showed metastases; 2 adenomas regressed spontaneously. In the second passage, 1 malignant adenopapilloma and 1 adenoma showed metastases; none of the tumors regressed. No metastatic tumors were noted in the third passage, but 2 adenomas underwent spontaneous regression. Adenopapillomas were considered malignant when histological study showed that they contained adenocarcinomatous and/or solid cancer cells.

69-2268 COMPARISON OF THE TUMORIGENIC EFFECTS IN *Drosophilia* OF URIDINES TRITIATED EITHER IN POSITION 5 OR IN POSITION 6. (Fr.) Ghelelovitch, S. (Inst. Radium, Paris 5). *C.R. Acad. Sci. [D] (Paris)* 268(1):237-239, 1969.

For 48 hr., *Drosophila* larvae (*cl tu* strain) were fed live yeast (*Sacharomyces cerevisiae*) of a uridine-deficient strain, grown on a minimal synthetic medium with added non-radioactive uridine (20 µg/ml) for control larvae and either uridine-5-^{3}H or uridine-6-^{3}H for experimental larvae. Melanic tumors were observed in the pupae 48-72 hr. after transformation, and were counted in the adults. The mortality rate was the same in the control and both experimental groups. The group receiving uridine-6-^{3}H developed twice as many tumors as the group receiving uridine-5-^{3}H, and their tumors were uniformly larger, suggesting that uridine-6-^{3}H goes to ^{3}H-thymidine, while uridine-5-^{3}H loses its ^{3}H during transformation, giving rise to non-radioactive thymidine. It is suggested that the intracellular loci whose mutation results in tumors are not the same as those whose mutation results in death.

69-2269 THREE CASES OF TESTICULAR ATROPHY IN A COLONY OF MONKEYS INGESTING A TOXIC CONTAMINANT. (Fr.) Monjour, L. (Fac. Med. Pharm., Dakar, Senegal), R. Giorgi, J. Toury and C. Quenum. *C.R. Soc. Biol. (Paris)* 162(7): 1454-1455, 1969.

A group of male and female cynocephalus monkeys (*Papio cynocephalus*; 2-3 yr. old) received a diet containing aflatoxin (0.75 mg/kg feed = 0.75 ppm). After 105-542 days on this diet (at sacrifice), 3 showed severe testicular atrophy, together with necrotizing hepatitis, hepatic sclerosis and steatorrhea. The other 4 males and the unspecified number of females on this diet are not described.

69-2270 EVOLUTION OF EARLY HEPATOMA IN RAINBOW TROUT. (It.) Codegone, M. L. (U. Turin, Italy), A. Provana and P. Ghittino. *Tumori* 54(6):419-425, 1968.

Peanut flour diets containing aflatoxins B_1 (AB1) and B_2 (AB2) were fed for 13 mo. to groups of hatchery rainbow trout; liver pathology was studied at the end of this period. In 1 group fed a 50% peanut flour diet containing 0.36 ppm of AB1 and traces of AB2, 26.6% developed disseminated, microscopic hepatic nodules (consisting of cells with markedly basophilic cytoplasm) and 2.2% showed macroscopically recognizable hepatomas. Comparable tabulations for another group fed a diet containing 25% of the same peanut flour, were 22.2% and 0%, resp. In a third group, fed a peanut flour diet believed to be free of aflatoxin, but in which 0.033 ppm of AB1 and 0.006 ppm of AB2 were later demonstrated subsequently, no microscopic lesions or hepatomas were seen after 13 mo. of feeding. These 3 groups were taken off the peanut flour diets and fed fresh beef liver for an additional 13 mo. At the end of this period, microscopic liver nodules were seen in 38.4%, 27.9% and 51.1%, resp., and macroscopically recognizable hepatomas were confirmed histologically in 13.4%, 20.8% and 2.3%, resp. It is concluded that the microscopic nodules induced by the peanut flour diet were true neoplasms.

69-2271 REACTION OF THE GLUCURONIDE OF THE CARCINOGEN N-HYDROXY-2-ACETYLAMINO-FLUORENE WITH NUCLEIC ACIDS. (E.) Irving, C. C. (U. Tennessee, Memphis), R. A. Veazey and J. T. Hill. *Biochim. Biophys. Acta* 179(1):189-198, 1969.

To study the interaction of the glucuronide of N-hydroxy-N-2-fluorenylacetamide (OH-FAA; N-hydroxy-2-acetylaminofluorene) with nucleic acids *in vitro*, sodium (N-acetyl-N-2-[9-^{14}C]-fluorenylhydroxylamine-β-D-glucosid)uronate was incubated with yeast transfer RNA, calf thymus DNA or rat liver ribosomal RNA and the recovered nucleic acids were purified. When 0.6 µmole of OH-FAA glucuronide was incubated with 2 mg of nucleic acid at pH 8 (37°) the binding of radioactivity was linear with time (amounting to 4-8 mµmoles/mg of nucleic acid at 24 hr.). The OH-FAA glucuronide reaction with RNA or DNA increased with increasing pH. *In vivo* binding of radioactivity to rat liver rRNA and DNA was greater after admin. of OH-FAA glucuronide than after admin. of labeled N-2-fluorenylacetamide (FAA; 2-acetylamino [9-^{14}C]fluorene), but less than after admin. of labeled OH-FAA. It is concluded that OH-FAA glucuronide (known metabolite of 2 carcinogens, FAA and OH-FAA) may partly account for *in vivo* binding of these carcinogens to liver nucleic acids.

69-2272 STUDIES OF THE INHIBITION OF BENZPYRENE HYDROXYLATION BY VARIOUS POLYCYCLIC AROMATIC HYDROCARBONS. (Ger.) Kunte, H. (U. Mainz, Germany). *Z. Krebsforsch.* 72(1): 57-62, 1969.

In a mouse liver microsome system, 3,4-benzpyrene hydroxylation was inhibited by fluoranthene, pyrene, benz(a)anthracene and phenol.

69-2273 STUDIES OF THE BIOLOGICAL ACTION OF BENZO(a)PYRENE. II. EFFECT OF GAMMA IRRADIATION ON INDUCTION OF MICROSOMAL HYDROXYLASES BY BENZO(a)PYRENE. (Fr.) Delwaide, P. (U. Liege, Belgium), D. Rondia and C. Heusghem. Biochem. Pharmacol. 18(4):959-962, 1969.

In the livers of male albino rats, ^{137}Cs irradiation (500-2000 r; 20 hr. before sacrifice) stimulated microsomal 3,4-benzpyrene (BP) hydroxylase activity. The induction of hydroxylase by BP (20 mg/kg) was moderately enhanced by radiation doses of 500-1500 r, if irradiation was admin. within 2-4 hr. after BP. Other doses and time schedules of irradiation slightly inhibited the response to BP induction. The responses to irradiation (alone or with BP) were partially inhibited by cystamine.

69-2274 INDUCTION OF LIVER TUMOURS IN THE RABBIT BY FEEDING DIMETHYLNITROSAMINE. (E.) Le Page, R. N. (U. Melbourne, Australia) and G. S. Christie. Brit. J. Cancer 23(1): 125-131, 1969.

In 11 male and 17 female random-bred rabbits admin. a diet containing dimethylnitrosamine (DMN; 25-100 ppm for 17-94 wk.), the higher doses (50 or 100 ppm) often caused death after 2-10 wk. Cirrhosis developed after 18-30 wk. with moderate levels of DMN (50 ppm) and after 23-60 wk. with the lowest dose. Four animals developed hepatocellular liver tumors (3 were receiving 25 ppm and 1 was receiving 50 ppm of DMN); 3/4 also showed lung metastases. Two other animals developed cholangiomas of the liver. At 50 ppm of DMN, 23 wk. was required for the development of a liver tumor. One female rabbit with a hepatocellular tumor also developed a primary tumor of the kidney. Of the 6 animals developing tumors, 5 were females.

69-2275 CARCINOGENIC ACTIVITY OF DIETHYLNITROSAMINE IN SWINE. (Ger.) Schmähl, D. (German Cancer Res. Ctr., Heidelberg, Germany), H. Osswald and K. Goerttler. Z. Krebsforsch. 72(1):102-104, 1969.

After 470 or 594 days of p.o. admin. of diethylnitrosamine (1.5-3.0 mg/kg/day), 2/2 swine showed severe liver cirrhosis with hepatomas, and 1/2 also showed a renal adenoma.

69-2276 AN ULTRASTRUCTURAL STUDY OF THE TOXIC AND CARCINOGENIC EFFECTS OF 2-AMINO-5-AZOTOLUENE ON THE LIVERS OF SCHISTOSOME-INFECTED AND UNINFECTED MICE. (E.) Liu, L. B. (Evanston Hosp., Evanston, Ill.), E. O. Domingo, R. J. Stenger, K. S. Warren, D. B. Confer and E. A. Johnson. Cancer Res. 29(4):837-847, 1969.

The effects of Schistosoma mansoni (Sm) infection (30 cercariae s.c.) on liver carcinogenesis by 2-amino-5-azotoluene (AAT; 1 inj./mo. for 9 mo.) were studied in female CBA mice. Liver ultrastructure was studied 24-52 wk. after Sm infection. No hepatomas developed in 80 untreated, uninfected controls or in 100 untreated, Sm-infected mice. Hepatomas (with ultrastructural characteristics resembling those of hepatic parenchymal cells) developed in 14 AAT-treated mice. In 95 AAT-treated, uninfected mice, the ultrastructural features of toxic liver damage were more extensive and severe than in 135 AAT-treated, Sm-infected mice, but the hepatoma frequencies were 1/95 and 13/135, resp. It is concluded that the hepatotoxic effects of AAT were not necessarily related to its carcinogenic effect.

69-2277 THE DEVELOPMENT OF CARCINOMA IN LIVER OF RATS TREATED WITH m-TOLUYLENEDIAMINE AND THE SYNERGISTIC AND ANTAGONISTIC EFFECTS WITH OTHER CHEMICALS. (E.) Ito, N. (Nara Med. U., Japan), Y. Hiasa, Y. Konishi and M. Marugami. Cancer Res. 29(5):1137-1145, 1969.

Male Wistar rats were fed diets containing m-toluylenediamine (m-TD; 0.06% or 0.1%), alone or in combination with DL-ethionine (E; 0.25%), 3-methylcholanthrene (MC; 0.0067%), α-naphthyl isothiocyanate (ANI; 0.1%) or p-hydroxypropiophenone (PHP; 1.0%). In 1 series, m-TD was admin. alone for 36 wk.; other groups were admin. m-TD + E in 4- or 8-wk. courses, and another series of rats received m-TD + MC, ANI or PHP for 20 or about 35 wk. Diets containing m-TD alone induced hepatocellular carcinomas (with invasion and metastases); simultaneous admin. of E potentiated the carcinogenic effects of m-TD. No liver tumors developed in rats admin. m-TD + MC. MC seemed to accelerate the destruction of m-TD by the induction of liver enzymes, but did not affect the development of E-induced premalignant or malignant liver lesions. ANI and PHP also completely inhibited the carcinogenic effects of m-TD, possibly by affecting its metabolism in the same way as MC.

69-2278 GLUCOSE-6-PHOSPHATASE ACTIVITY IN PRIMARY RAT LIVER TUMORS INDUCED BY HIGH DOSES OF 4-DIMETHYLAMINOAZO-BENZENE. (E.) Hadjiolov, D. (Oncol. Res. Inst., Sofia). Z. Krebsforsch. 72(1):43-46, 1969.

In male Wistar rats with liver tumors induced by high doses of 4-dimethylaminobenzene (DAB; up to 1125 mg/rat in the diet) glucose-6-phosphatase (G6Pase) activity in the tumor cells was about the same as in normal liver tissue (staining intensity was used as a criterion). Some tumor cords showed higher G6Pase activity than the cells of the adjacent liver parenchyma, which displayed degenerative alteration. It is suggested that malignant transformation in the liver may be an organoid-tissue adaptation of primitive stem cells in the course of DAB carcinogenesis.

69-2279 EFFECT OF FEEDING AMINO AZO DYES ON MITOCHONDRIAL SWELLING AND CONTRACTION. KINETIC EVIDENCE FOR DELETION OF MEMBRANE REGULATORY SITES. (E.) Arcos, J. C. (USPHS Hosp., New Orleans, La.), J. B. Mathison, M. J. Tison and A. M. Mouledoux. Cancer Res. 29(6): 1288-1297, 1969.

Changes in the index of sensitivity of mitochondrial swelling in response to an inducer (calcium or mercury ions, hypotonicity, arsenate, glutathione, phlorizin, phosphate, etc.) showed deletion of swelling-inducer receptor sites in liver mitochondria during liver carcinogenesis by 3'-methyl-4-dimethylaminoazobenzene (3'-Me-DAB) in male Sprague-Dawley rats, irrespective of the nature of the specific inducer. With admin. of the relatively inactive 2-methyl-4-dimethylaminoazobenzene 2-Me-DAB, this index increased or decreased with different specific inducers. Levels of KCl (0.6 M)-extractable protein (formerly regarded as the contractile entity of the mitochondrial membrane) were not affected by 3'-Me-DAB or 2-Me-DAB feeding (10 wk.); this protein eventually increased 4-fold in the mitochondria of the 3'-Me-DAB hepatomas, although these mitochondria were comparatively nonresponsive to induction of swelling and contraction.

69-2280 EFFECT OF C-21 STEROIDS ON p-DIMETHYLAMINOAZOBENZENE (DAB) LIVER CARCINOGENESIS IN RATS. (Fr.) Lacassagne, A. (Inst. Radium, 26 Ulm St., Paris), M.-F. Jayle and L. Hurst. C.R. Acad. Sci. [D] (Paris) 268(4): 740-743, 1969.

The effects of various steroids (40 mg/kg of feed, except 2.2 mg/kg with dexamethasone) on the development of Stage IV (irreversible lesions), Stage V (single tumors) or Stage VI (multiple tumors) lesions of the liver, induced by 4-dimethylaminoazobenzene (DAB; 600 mg/kg of protein- and riboflavin-deficient feed), were studied in adult male Wistar rats. Corticosterone and deoxycorticosterone (DOC) had little effect on DAB carcinogenesis. The other steroids delayed the formation of DAB-induced lesions, and the survivors in all groups except the group admin. hydrocortisone (H) showed no tumors at sacrifice. Admin. of H did not prevent the formation of Stage V or VI lesions. Dexamethasone (D) prevented the formation of Stage VI lesions. Progesterone was more effective than D (the delay in formation of Stage IV and V lesions was longer than with D), but 17α-hydroxyprogesterone did not prevent the formation of Stage VI lesions. Pregnenolone and 17α-hydroxypregnenolone blocked the formation of both Stage V and Stage VI lesions, and pregnenolone also inhibited the formation of Stage IV lesions. Addition of o,p'-dichlorodyphenyldichloroethane 600 mg/kg feed) to DAB-containing diets (with or without steroids) prevented the formation of Stage VI lesions, and delayed the formation of DAB-induced lesions. When H was added to diets containing DAB + o,p'-DDD, the survivors had no tumors at sacrifice. No Stage IV, V or VI lesions developed in rats fed DOC or DOC + D in addition to DAB and o,p'-DDD.

69-2281 EFFECTS OF CARCINOGENIC, NONCARCINOGENIC, AND COCARCINOGENIC AGENTS ON THE BIOSYNTHESIS OF NUCLEIC ACIDS IN MOUSE SKIN. (E.) Paul, D. (Salk Inst. Biol. Studies, San Diego, California). Cancer Res. 29(6):1218-1225, 1969.

In the skin of inbred male and female NMRI mice, the effects of 9,10-dimethyl-1,2-benzanthracene (DMBA), 1,2,3,4-dibenzanthracene (1,2,3,4-DBA; not carcinogenic; both at 10 μmoles p.o.) and a cocarcinogen (fraction A1 from croton oil; 0.06 μmole topically) on the incorporation of labeled nucleic acid precursors into DNA and RNA was studied. Precursor incorporation into both DNA and RNA reached max. values at 48 hr. following DMBA admin., after a 24-hr. period of inhibition; RNA biosynthesis subsequently decreased, but DNA activation continued for 1 wk. or more. In contrast, 1,2,3,4,-DBA markedly stimulated RNA biosynthesis, but had no significant effect on DNA synthesis. The incorporation of ^{3}H into RNA was significantly high for more than 168 hr. after several applications of fraction A1; after a single application, DNA was stimulated for 24-72 hr. The initial 24-hr. inhibition period was seen only with DMBA.

69-2282 SUSPICIOUS INFLUENCE OF THYMECTOMY ON SKIN PAPILLOMA INDUCTION. (E.) Yasuhira, K. (Kyoto U., Japan). Gann 60(1): 57-64, 1969.

Thymectomized (thmx.; 12 hr.-14 days after birth), non-operated or sham-operated CFW mice were treated either with urethan (U; 1 inj.; 0.5 ml of 10% soln. i.p.) followed by applications of croton oil (CO; 0.25 ml of 0.1% soln.; 5 doses/wk. for 32 wk.), or with 3-methylcholanthrene alone (MC; paintings of 0.03% soln. for 43 wk.). Thymx. mice admin. U + CO developed fewer and later skin papillomas than non-operated controls. In the MC-treated mice, papillomas developed earlier in some thymx. mice than in non-operated controls. Since patterns of tumor induction in the sham-operated mice admin. U + CO or MC alone were similar to those seen in the thmx. mice, the responses were attributed to neonatal surgical invasion, not to impairment of immunity. Skin carcinomas appeared earlier in thymx. mice admin. MC than in sham-operated mice (the difference was 6 wk.), suggesting that an immune mechanism affected the induction of carcinomas but not of papillomas.

69-2283 7,12-DIMETHYLBENZANTHRACENE TUMOR INDUCTION IN MUTANT (HAIRLESS, ASEBIC, AND HAIRLESS-ASEBIC) MICE. (E.) Arundell, F. D. (Stanford U. Sch. Med., Calif.), M. A. Karasek and A. H. Gates. J. Invest. Derm. 52(2): 119-125, 1969.

In mice of a normal strain (F_1 hybrids of strains BALB/cGa and 129/RrGa), a homozygous asebic strain (BALB/cGa$^-$+ab), a homozygous hairless strain, and a homozygous hairless-asebic strain, 9 wk. of painting with 7,12-dimethylbenzanthracene (DMBA; total, 2500 µg) induced premalignant warty papillomas in all mice by 9 wk. Squamous cell carcinomas of the skin developed in 9/22, 4/10, 3/8 and 3/14 of the normal, hairless, hairless-asebic and asebic mice, resp., that survivied beyond 10 wk. It is concluded that the sebaceous glands do not play a critical role in DMBA induction of squamous cell carcinoma.

69-2284 THE EFFECTS OF A SINGLE DOSE OF 7,12-DIMETHYLBENZ(a)ANTHRACENE ON THE EPIDERMIS AND HAIR FOLLICLES OF MICE, WITH NOTES ON CONCURRENT CHANGES IN THE OVARIES AND ADRENALS. (E.) Bond, B. (Michigan Cancer Found., Detroit) and J. W. Orr. Brit. J. Cancer 23(1):188-196, 1969.

In 28 female mice of strains BALB/cf/Sp, March (MAf/Sp) and C3H/Sp, a single topical application of 7,12-dimethylbenzanthracene (DMBA; 0.15 ml of 0.5% acetone soln.) caused macroscopic epilation after 6 days. Histological examination after 4 days showed necrosis or destruction of the distal parts of the hair follicles and sebaceous glands, as well as epidermal regeneration. New hair follicles were differentiated de novo from this regenerated epidermis. Croton oil (0.5% in acetone; 2 paintings/wk.) was admin. to the BALB/cf and MAF mice surviving 28 days. Tumors arose from the superficial epidermis, but the hair follicles were not involved and the tumors showed no trichoepitheliomatous structure. The tumors also attracted mast cells (this was more marked in the papillomas than in the carcinomas). Irreversible loss of oocytes was seen in BALB/cf and MAF mice after 6 days; the oocytes of C3H mice were less sensitive to DMBA. Mice of all strains showed transient degeneration of all zones of the adrenal except the zona fasciculata; no adrenal necrosis was seen, and all zones (including the medulla) later recovered.

69-2285 THE EFFECT OF TOPICAL VITAMIN A ON PAPILLOMAS AND INTRAEPITHELIAL CARCINOMAS INDUCED IN HAMSTER CHEEK POUCHES WITH 9,10-DIMETHYL-1,2-BENZANTHRACENE. (E.) Polliack, A. (Hebrew U., Hadassah Sch. Med., Jerusalem) and I. S. Levij. Cancer Res. 29(2):327-332, 1969.

In 6 hamsters sacrificed immediately after 6 wk. of cheek pouch painting with 7,12-dimethylbenzanthracene (DMBA; 0.5% in paraffin; 3 doses/wk.) and 6 animals sacrificed after an additional 2 mo. without treatment, benign papillomas (up to 2 mm in diameter) were seen in 6/6 and 3/6 resp.; foci of intraepithelial carcinomas were noted in 6/6 and 0/6, resp. In 6 hamsters receiving DMBA for 6 wk. (as above) followed by a 2-mo. application of paraffin, only 1/6 showed a tumor (papilloma with intraepithelial carcinoma). A 6-wk. course of DMBA (as above), followed by application of 10% vitamin A (VA) palmitate for 2 mo., induced infiltrating squamous cell carcinomas in 6/6. The enhancing effect of VA might be related to increased permeability of the cellular and subcellular membranes, resulting in an increased permeation of DMBA into the cells. However, since DMBA was stopped before VA admin. was begun, it is suggested that VA had a direct effect on the metabolic processes of epithelial cells previously altered by DMBA.

69-2286 INHIBITION OF TUMOR INDUCTION IN TWO-STAGE CARCINOGENESIS ON MOUSE SKIN. (E.) Van Duuren, B. L. (New York U. Med. Ctr., N. Y.), A. Sivak, C. Katz and S. Melchionne. Cancer Res. 29(4):947-952, 1969.

Skin tumors were initiated in female Swiss ICR/Ha mice by a single painting of 7,12-dimethylbenzanthracene (DMBA), promoted by croton oil, and tested for inhibition by 7 agents applied at different intervals (from 14 days before to 30 days after DMBA painting). Actinomycin D inhibited DMBA tumor induction by 35.8% at 5 µg and 66.4% with 20 µg, while aflatoxin B_1 caused 34.7% inhibition; they caused the most inhibition when admin. 30 and 7 days after DMBA, resp. Acridine orange and dl-diepoxybutane caused max. inhibition of tumor initiation (57.4% and 46.0%, resp.) when admin. at the same time as DMBA. Chloroquine mustard, uracil mustard, cytosine arabinoside, diketene, glycidaldehyde and 1,2,3,4-diepoxycyclohexane had little or no effect on DMBA tumor induction. It is concluded that initiation is a complex sequential process, varying in its susceptibility to inhibitors of different types and the times of application of the inhibitors relative to the time of initiation of DMBA treatment.

69-2287 THE INHIBITION OF DNA SYNTHESIS BY INITIATORS OF MOUSE SKIN TUMORIGENESIS. (E.) Hennings, H. (U. Wisconsin Med. Ctr., Madison) and R. K. Boutwell. Cancer Res. 29(3):510-514, 1969.

Female STS mice were admin. single topical doses of 7,12-dimethylbenzanthracene (DMBA; 1-100 µg), 4-nitroquinoline-N-oxide (NQO; 50 or 500 µg), urethan (U; 60 mg topically or inj./g i.p.) or β-propiolactone (BPL; 120-480 µmoles), followed by croton oil promotion. A direct correlation was seen between the extent of initial inhibition of DNA synthesis in the skin and the carcinogen dosage in all cases, but no direct correlation was seen between the tumor frequency and the DNA-inhibiting dosage. Doses of BPL, U and NQO that inhibited DNA synthesis either failed to initiate tumors or induced fewer tumors than the 10 µg dose of DMBA, which had little effect on DNA synthesis. It is concluded that the degree of inhibition of DNA synthesis is not directly related to the number of tumors initiated.

69-2288 CONCOMITANT IMMUNITY IN HAMSTERS BEARING DMBA-INDUCED TUMOR TRANSPLANTS. (E.) Lausch, R. N. (Baylor U. Coll. Med., Houston, Tex.) and F. Rapp. Int. J. Cancer 4(2):226-231, 1969.

Adult hamsters bearing growing transplants of 7,12-dimethylbenzanthracene (DMBA)-induced sarcomas showed a specific immune response, as demonstrated by rejection of conc. of DMBA-tumor cells capable of tumor induction in normal animals; 9/24 of the treated hamsters and 15/16 controls responded to this challenge by developing tumors. This response also occurred when the challenge cells and the immunizing cells were inoc. simultaneously. Challenge with SV40-transformed hamster cells did not elicit this immune response.

69-2289 CHROMIUM CARCINOGENESIS: CALCIUM CHROMATE AS A POTENT CARCINOGEN FOR THE SUBCUTANEOUS TISSUES OF THE RAT. (E.) Roe, F. J. C. (Chester Beatty Res. Inst., London) and R. L. Carter. Brit. J. Cancer 23(1):172-176, 1969.

In male CB rats, admin. of calcium chromate (1 dose/wk. i.m. in peanut oil; total 19 mg over 20 wk.) induced spindle cell or pleomorphic cell sarcomas of the s.c. tissues at the inj. site in 18/24 rats (75%) after 63 wk. of observation. The mean tumor induction time was 323 days. No systemic toxicity, metastases or tumors at other sites were observed. Vehicle-treated controls showed no tumors.

69-2290 THE INTERACTION OF CARCINOGENIC METALS WITH TISSUES AND BODY FLUIDS. COBALT AND HORSE SERUM. (E.) Heath, J. C. (Strangeways Res. Lab., Cambridge, England), M. Webb and M. Caffrey. Brit. J. Cancer 23(1):153-166, 1969.

Powdered metallic cobalt (15 mg) dissolved slowly when incubated aerobically (at 37° C) with 50 ml of horse serum; the resulting soln. had a characteristic color and formed complexes of both small molecular components and the serum proteins (binding by albumin was greater than binding by the globulins). This cobalt-serum complex (obtained after 28 days of incubation) was less toxic to rat myoblasts in vitro than an equal amount of ionic Co^{2+}, although in actively growing cultures the complex induced cytological changes resembling those seen in premalignant myoblasts in vivo. It is suggested that the cobalt-protein complexes which form at the site of i.m. inoc. of metallic cobalt powder in rats, may provide carriers for the transport of cobalt ions into the free myoblasts of regenerating muscle, and later into the cells of the developing rhabdomyosarcoma.

69-2291 LIFE TERM STUDIES ON THE EFFECT OF TRACE ELEMENTS ON SPONTANEOUS TUMORS IN MICE AND RATS. (E.) Kanisawa, M. (Dartmouth Sch. Med., Hanover, N. H.) and H. A. Schroeder. Cancer Res. 29(4):892-895, 1969.

Random-bred Charles River (CD-1) white Swiss mice were admin. 4 different non-essential trace elements in the drinking water (5 ppm; the diets fed to all mice contained trace levels of 2/4 elements), and random-bred Long-Evans rats received the same conc. of 6 other non-essential trace elements in the drinking water (the diets fed to all rats contained trace levels of 5/6 elements), from weaning until death. Except for a significant reduction in the number of tumors other than liver, lung, mammary or adrenal tumors in the germanium-fed rats, spontaneous benign and malignant tumors were as frequent in these animals as in the controls. None of the trace elements induced tumors at the conc. used.

69-2292 THE EFFECT OF ISOGENIC LYMPHOID CELLS ON PRIMARY SARCOMAS IN THE RAT. (E.) Blamey, R. W. (Welsh Nat. Sch. Med., Cardiff, Wales). Cancer Res. 29(2):333-334, 1969.

In female inbred Wistar rats (3-9 mo. old) with primary sarcomas induced by s.c. inj. of 3-methylcholanthrene (3 mg in olive oil) and inoc. with isogenic spleen and lymph node cells, without prior sensitization, the av. time required for a 1.0-cm tumor to reach a mean diameter of 4.0 cm was 41.31 days, compared to 29.37 days in untreated controls. Possible mechanisms for this retardation of tumor growth are discussed, including the provision of lymphoid cells not tolerant to the tumor-specific antigen, or the restoration of depleted immune competence.

69-2293 RETICULOENDOTHELIAL ACTIVITY DURING THE GROWTH OF RAT SARCOMAS. (E.) Blamey, R. W. (Welsh Nat. Sch. Med., Cardiff, Wales), D. L. Crosby and J. M. Baker. Cancer Res. 29(2):335-337, 1969.

Clearance of colloidal carbon (30 mg/100 g body wt. i.v.) from the blood stream of Wistar rats bearing primary or isotransplanted 3-methylcholanthrene-induced sarcomas was enhanced greatly by the growth of both tumor types. Colloidal ^{198}Au (0.5 μC) was cleared more rapidly by the livers and spleens of tumor-bearing rats, but the final distribution was the same as in tumor-free controls. Since a very large tumor took up less than 1% of the radioactive colloid, it is concluded that neither tumor uptake nor an altered colloid distribution can explain the rapid clearance in tumor-bearing animals. Colloid clearance gave a quantitative measure of RES activity, reflecting both macroscopic and microscopic changes.

69-2294 IMMUNOLOGIC PROPERTIES OF METHYLCHOLANTHRENE-INDUCED SARCOMAS OF NEONATALLTY THYMECTOMIZED MICE. (E.) Nomoto, K. (Kyushu U. Sch. Med., Fukuoka, Japan) and K. Takeya. J. Nat. Cancer Inst. 42(3):445-453, 1969.

In neonatally thymectomized (thmx.) mice (48 hr. after birth) of 2 inbred strains (AKR and C3H) and 1 outbred strain (CF1), s.c. inj. of 3-methylcholanthrene (MC; 0.5 mg in peanut oil + cholesterol) at age 4 wk. induced sarcomas after 75 days or more (compared to 100 days or more in intact control mice). MC tumor induction was enhanced by thymx. in AKR and CF1 mice, but not in C3H mice. Several tumors from AKR and C3H mice, transplanted into 4-6-wk.-old, neonatally thmx. isogeneic mice, showed a slower growth rate than control tumors (induced in intact mice), and were composed of cell population(s) weakly resistant to the immune response of the normal host. These tumors were transferred through isogeneic normal hosts, reaching isotransplantability equal to that of tumors of normal mice after several passages. MC-induced tumors of low isotransplantability showed more cellular infiltration than tumors of high isotransplantability (or spontaneous mammary tumors). It is concluded that tumors of supposedly high antigenicity can elicit the cellular reaction of the host against the tumors themselves, and that they might be suppressed by the immune response of the normal host.

69-2295 THE ROLE OF THE SPLEEN IN THE IMMUNITY TO A CHEMICALLY INDUCED SARCOMA IN C3H MICE. (E.) Bard, D. S. (Boston Hosp. Women, Mass.) and Y. H. Pilch. Cancer Res. 29(5): 1125-1131, 1969.

Female C3H/HeN mice were inoc. i.m. with cells from a 3-methylcholanthrene-induced fibrosarcoma; 3 wk. later, the tumor-bearing hindlimbs were amputated. When spleen cells from these mice were inoc. (i.p.) into syngeneic mice, they caused an adoptive transfer of immunity to the same tumor. Spleen cells from non-tumor-bearing amputated mice did not protect the recipients from the tumor. The time interval between amputation in the donors, and tumor challenge in the spleen cell recipients was related to the induction of antitumor immunity. This relationship remained constant when the amputation-splenectomy and the spleen cell inoc.-tumor challenge intervals were varied. Splenectomy did not affect the growth of the primary tumor transplant, but it abolished the immune response in amputated, tumor-bearing mice.

69-2296 TUMOUR SPECIFIC IMMUNOGENICITY OF METHYLCHOLANTHRENE-INDUCED SARCOMA CELLS AFTER INCUBATION IN NEURAMINIDASE. (E.) Currie, G. A. (Fulham Hosp., London) and K. D. Bagshawe. Brit. J. Cancer 23(1):141-149, 1969.

Cell suspensions of 5 sarcomas, induced in inbred adult male CBA mice by s.c. inj. of 3-methylcholanthrene (800 μg in liquid paraffin) were incubated with neuraminidase (Vibrio cholerae), then transplanted i.p. into irradiated (600 r) or normal intact syngeneic mice. Cells of 4/5 sarcomas studied did not develop in vivo after incubation with neuraminidase; when the 50-day survivors among these mice were inoc. again with the tumors, they all showed marked antitumor immunity. Neuraminidase-treated antigenic tumor cells grew well in irradiated mice. The antigenicity of the 5 tumors was apparently negatively correlated to the duration of the carcinogenic latent period. It is concluded that under conditions in which the only tumor-host antigenic discrepancy is tumor-specific, neuraminidase treatment can enhance the effective immunogenicity of the tumor cells.

69-2297 INDUCTION OF PLASMA CELL TUMOURS IN BALB/c MICE WITH 2,6,10,14-TETRAMETHYLPENTADECANE (PRISTANE). (E.) Anderson, P. N. (NCI, Bethesda, Md.) and M. Potter. Nature (London) 222(5197):994-995, 1969.

In female BALB/cAnN mice, 3 i.p. inj. (0.5 ml each, 2 mo. apart) of 2,6,10,14-tetramethylpentadecane (Pristane, Norphytane) induced plasma cell tumors in 9/30 and thymic lymphocytic leukemia in 1/30, after 9 mo. No peritoneal tumors were seen in controls. One of the plasma cell tumors, which produced IgA-type immunoglobulin myeloma protein, was established in serial transplantation. Microscopic examination of this tumor showed a widespread peritoneal granuloma reaction, similar to that seen after plasmacytoma induction with white mineral oils. Pristane acts as a powerful, long-acting immunologic adjuvant, and has been found in small conc. in human, rodent and bovine serum and tissues. It is suggested that saturated, branched-chain hydrocarbons of this type are not necessarily metabolically inert in animal tissues.

69-2298 HISTOLOGICAL AND AUTORADIOGRAPHIC STUDIES OF A CHEMICALLY INDUCED

CARCINOMA OF THE AUDITORY CANAL IN THE RAT. (Ger.) Rosemann, G., J. T.-Y. Chou and H. R. Nitze. Arch. Klin. Exp. Ohr. Nas. Kehlkopheilk. 191(2):704-705, 1968.

Mature albino rats (both sexes) fed unspecified doses of 4-dimethylaminostilbene, developed well-differentiated papillary squamous cell carcinomas of the auditory canal within about 280 days, accompanied by other tumors (unspecified) in other organs. The tumors of the auditory canal grew rapidly. In vitro autoradiographic studies with ^{3}H-thymidine showed that the areas of active growth were in the relatively undifferentiated basal and parabasal zones immediately bordering the highly-vascularized connective tissue; the number of labeled cells diminished progressively and rapidly in zones more distant from these areas. Within 3 days after a single X-irradiation, necrotic spots began to appear within the tumors and the tumor tissue began to dissociate itself from the underlying connective tissue, and the inflamed, infiltrated stroma of the connective tissue began to show increased capillary vascularization.

69-2299 CYTOLOGICAL AND MICRORESPIROMETRIC STUDIES OF A CHEMICALLY INDUCED CARCINOMA OF THE AUDITORY CANAL IN THE RAT. (Ger.) Chou, J. T.-Y., H. R. Nitze and G. Rosemann. Arch. Klin. Exp. Ohr. Nas. Kehlkopheilk. 191(2):705-706, 1968.

Individual cells of this tumor (measuring 15.5-30.0 μ) had very large nuclei (usually containing several large nucleoli), and many of the cells were polynuclear. The size and distribution of mitochondria in the tumor cells were within normal range. The larger cells contained achromatic, fluid-filled vacuoles (measuring 1.3-2.6 μ). During interphase, intense RNA activity was seen in the large nucleoli and the cytoplasm. In early anaphase, clumps of large RNA granules were seen in the equatorial region; in later anaphase they were found at both poles; during metaphase, they were grouped in the vicinity of the chromosomes. Mean oxygen consumption in tumor tissue from 12 animals was 3.29 μl/0.2 mg dry wt. Other studies suggested that the malignancy of these tumors was related directly to a quantitative increase of cholesterol and irregular distribution of RNA.

69-2300 GROWTH RATE AND DNA CONTENT OF A CHEMICALLY INDUCED CARCINOMA OF THE AUDITORY CANAL IN THE RAT. (Ger.) Nitze, H. R., J. T.-Y. Chou and G. Rosemann. Arch. Klin. Exp. Ohr. Nas. Kehlkopheilk. 191(2):707-708, 1968.

In these tumors, the mean time required for doubling the DNA content of cells in interphase was 4.0 days, and the mean time required for the tumors to double in size was 34.0 days. The tumor cells were hypooctoploid, with large nuclei.

69-2301 UNUSUAL RESPONSE TO ANDROGEN OF ESTROGEN-DEPENDENT MAMMARY TUMORS. (E.) Cutts, J. H. (U. Missouri Sch. Med., Columbia). J. Nat. Cancer Inst. 42(3):485-488, 1969.

Female hooded rats developed mammary tumors 292 ±2.52 days after implantation of estrone pellets. Admin. of testosterone propionate (TP; 3 doses/wk. of 0.25 mg) was begun 40 days after tumor development; the estrone pellets were removed on day 406, but TP was continued. The tumors regressed promptly in the initial stages of TP admin., but later acquired resistance and grew again during continued treatment with TP. If TP was continued after removal of the estrone pellets, 75/78 rats showed complete tumor regression. The other 3/78 rats showed incomplete tumor regression, but these tumors regressed completely when TP was discontinued. It is suggested that these tumors may have been able to utilize TP or convert it to estrogen, which supported tumor growth.

69-2302 BIOCHEMICAL CHARACTERISTICS OF MAMMARY GLANDS AND MAMMARY TUMORS OF RATS INDUCED BY 3-METHYLCHOLANTHRENE AND 7,12-DIMETHYLBENZ(a)ANTHRACENE. (E.) Hilf, R. (Squibb Inst. Med. Res., New Brunswick, N. J.), H. Goldenberg, I. Michel, M. J. Carrington, C. Bell, M. Gruenstein, D. R. Meranze and M. B. Shimkin. Cancer Res. 29(5):977-988, 1969.

In Wistar or Sprague-Dawley rats with mammary tumors induced by 1 dose of 3-methylcholanthrene (MC) or 1-several doses of 7,12-dimethylbenzanthracene (DMBA), mammary tumors induced by a single dose of DMBA showed RNA, DNA and triglyceride levels, and activities of glucose-6-phosphate dehydrogenase and isocitrate dehydrogenase, which differed significantly from those seen in tumors induced by MC or multiple doses of DMBA. The decreases in enzyme activity induced by oophorectomy (oox.) in both types of tumors were similar; androgen or estrogen treatment caused biochemical changes that only partially resembled the effects of oox. A secretory response was seen in DMBA-induced tumors, but not in MC-induced tumors, after estrogen admin. Mammary gland enzyme activities in animals with DMBA-induced carcinomas were significantly below the activities seen in normal mammary glands or in MC-induced carcinomas. It is suggested that the different biochemical responses of DMBA- and MC-induced tumors to oox. and hormone admin. may be related to their different growth rates and hormone sensitivities.

69-2303 PITUITARY TUMORS INDUCED IN THE RAT BY ESTROGENS. I. FUNCTIONAL ACTIVITY, HISTOLOGY AND ULTRASTRUCTURE. (Fr.) Waelbroeck-Van Gaver, C. (Brugmann Hosp., Brussels) and P. Potvliege. Europ. J. Cancer 5(2):99-117, 1969.

In 6-7-mo.-old strain R Amsterdam rats (both sexes), prolonged estrogenization by s.c. implantation of pellets containing diethylstilbestrol dipropionate (25 mg) induced mammotropic-luteotropic pituitary tumors, 4 of which eventually became autonomous after repeated transplantation into estrogenized or untreated hosts. The primary estrogen-induced tumors were composed of mammotropic (prolactin) cells, but 3/4 of the autonomous tumors showed somatotropic as well as mammotropic activity, associated with somatotropic cells (1/3 also showed corticotropic cells). These 3 autonomous tumors grew rapidly and aggressively. The other autonomous tumor was less malignant and contained only mammotropic cells. It is suggested that the mammotropic cells were more sensitive to the regulatory influences of the estrogen at first, and later showed a greater tendency to autonomous growth, than the other pituitary cell types. It is also suggested that the somatotropic cells seen in the 3 mammosomatotropic autonomous tumors (and the corticotropic cells of 1/3 tumors) may have developed from a common acidophilic stem cell, which became pluripotent when the tumors became autonomous.

69-2304 PITUITARY TUMORS INDUCED IN THE RAT BY ESTROGENS. II. CYTOGENETIC STUDY. (Fr.) Waelbroeck-Van Gaver, C. (Brugmann Hosp., Brussels). Europ. J. Cancer 5(2):119-127, 1969.

Chromosomes were analyzed in pituitary tumors induced in male strain R Amsterdam white rats by prolonged estrogenization (s.c. implantation of 25-mg pellets of diethylstilbestrol dipropionate, lasting 6 mo.), and in transplanted estrogen-dependent and autonomous tumors of the same type. The primary (*in situ*) pituitary tumors showed a wide variety of chromosomal abnormalities; each tumor had an abnormal stemline of a different type. So long as the transplanted tumors remained estrogen-dependent (growing only in estrogenized or orchiectomized rats), the chromosomal abnormalities remained about the same as in the primary tumors. Once the tumors became autonomous (growing in untreated recipients), however, the number of chromosomal abnormalities increased markedly; this cytogenetic change was interpreted as a sign of tumor progression. No 2 tumor lines showed the same abnormal stemlines.

69-2305 ELECTRON MICROSCOPIC SEARCH FOR VIRUS PARTICLES IN MOUSE THYMUS DURING URETHAN LEUKEMOGENESIS. (It.) Lombardi, L. (Nat. Inst. Study Cure Tumors, Milan, Italy) and G. Della Torre. Tumori 54(6):449-464, 1968.

Inbred C3Hf mice (10 days old) were treated i.p. with urethan (1 mg/g every other day; 5 inj.). Thymic ultrastructure was studied in treated animals and untreated controls at age 3-14 wk., and in macroscopically demonstrable thymic lymphosarcomas from 2 groups of older mice (16 or 32 wk. old). Thymic lymphosarcomas developed in about 30% of the treated mice (after an av. of 20 wk.); no spontaneous tumors of this type were seen in untreated controls. Thymuses from all groups of treated and control animals showed mature and immature Type C particles (indistinguishable from particles of mouse leukemia viruses) and intracisternal Type A particles. Type A particles occurred significantly less frequently in thymuses from treated animals than in thymuses from controls. Immature Type C particles (found much less often than Type A particles) were found with equal frequency in all control and experimental groups. Mature Type C particles were found in small numbers in the thymuses of both treated and control animals, and were never found in thymic lymphosarcomas. It is concluded that urethan apparently caused a significant diminution of the number of intracisternal Type A particles found in the mouse thymus, and definitely did not stimulate proliferation of Type C particles.

69-2306 IMMUNODEPRESSIVE AND LEUKEMOGENIC EFFECTS OF URETHAN IN C3Hf and SWR MICE. (E.) Parmiani, G. (Nat. Inst. Study Cure Tumors, Milan, Italy), M. I. Colnaghi and G. Della Porta. Proc. Soc. Exp. Biol. Med. 130(3):828-830, 1969.

In inbred 10-day-old C3Hf/Dp and SWR/Dp mice, treatment with urethan (U; 5 doses of 1 mg/g at 2-day intervals) caused a definite and prolonged depression of the primary hemagglutinin (HA) response to sheep RBC. Of the 43 mice retained for observation after this treatment, 28 died of lymphosarcoma at an av. age of 27 wk. The tumors were significantly more frequent in mice with HA titers (at age 35 days) of 1:20 or less (9/9) than in mice with HA titers of 1:40, 1:80 or 1:160 (14/20, 5/11 and 1/3, resp.), illustrating the correlation of carcinogenesis and the degree of immunological impairment. Lung adenomas developed in all of the SWR mice, and hepatomas were seen in all of the C3Hf mice surviving beyond age 40 wk.

69-2307 ACTIVATION OF AN IMMUNE RESPONSE BY MEANS OF ETHYLNITROSOUREA. (Ger.) Kupfer, M. (Karl Marx U., Leipzig, Germany), G. Kupfer and U. Berger. Naturwissenschaften 56(4):216, 1969.

In inbred albino guinea pigs immunized by 1 inj. (0.1 ml) of a vaccine containing fresh guinea pig brain (1 part) and FA complement (not defined; 2 parts), the resulting allergic encephalomyelitis was exacerbated by concurrent p.o. admin. of N-ethyl-N-nitrosourea (ENU; 20 mg/kg/day for 8 days). Examination of lymph node histology (3-6 days after vaccine admin.) suggested that ENU potentiated the immune response by enhancing cell proliferation in the immune complex.

69-2308 OBSERVATIONS ON LEUKEMIA IN WISTAR FURTH RATS. (E.) Moloney, W. C. (Harvard Sch. Med., Boston, Mass.), A. E. Boschetti and V. King. Cancer Res. 29(4):938-946, 1969.

In 164 female and 50 male inbred Wistar Furth (W/Fu) rats, the incidence of spontaneous abnormal mononuclear (AMN) leukemia was 15.8% and 22%, resp. In females treated at age 4 or 12 mo. with 3-methylcholanthrene (MC; 180 mg), the leukemia incidence was 10.8% and 17.8%, resp.; when MC (80 mg) was admin. to 2-mo.-old females, 38% developed AMN leukemia. In 4-mo.-old rats exposed to total-body irradiation (450 r), or fed MC (90 mg) and then exposed to total-body irradiation (150 r), leukemia developed in 1.4% and 16.9%, resp. The disease was characterized by splenomegaly, leukemic infiltration of the liver, severe hemolytic anemia and abnormal mononuclear cells containing striking reddish granules. A long latent period was seen; AMN leukemia rarely developed before age 18 mo. No significant differences in the age at death (av. 22 mo.) or the hematological or clinical aspects of the leukemia were noted between untreated controls and rats treated with MC, X-rays, or both.

69-2309 COMBINED CARCINOGENESIS WITH POLYOMA VIRUS AND 2-ACETYLAMINOFLUORENE. (E.) Smith, R. D. (U. Illinois Coll. Med., Chicago, Ill.). Fed. Proc. 28(2):298, 1969.

69-2310 DIFFERENTIAL INHIBITORY EFFECT ON MOUSE LIVER DNA SYNTHESIS BY 9,12-DIMETHYLBENZANTHRACENE IN RELATION TO THE MITOTIC CYCLE AFTER PARTIAL HEPATECTOMY. (E.) Raick, A. N. (U. Toronto, Canada) and A. C. Ritchie. Fed. Proc. 28(2):365, 1969.

69-2311 ABNORMAL PROLIFERATIVE EFFECTS ON THE GAS PHASE OF CHARCOAL FILTERED FRESH CIGARETTE SMOKE ON 3T3 CELLS. (E.) Leuchtenberger, C. (Swiss Inst. Exp. Cancer Res., Lausanne, Switzerland), R. Leuchtenberger, J. Blanchard and M. Deckert. Fed. Proc. 28(2):683, 1969.

69-2312 THE ROLE OF IMMUNITY TO TUMOR-SPECIFIC TRANSPLANTATION ANTIGENS IN THE DEVELOPMENT OF PRIMARY TUMORS INDUCED IN MICE WITH 3-METHYLCHOLANTHRENE. (E.) Haughton, G. (U. North Carolina Sch. Med., Chapel Hill), J. Wagner and E. Sigmon. Fed. Proc. 28(2):568, 1969.

69-2313 POSSIBLE MECHANISMS FOR ADRENAL NECROSIS AFTER 7,12-DIMETHYLBENZANTHRACENE. (E.) Harris, C. (Philadelphia Geriat. Ctr., Pa.). Fed. Proc. 28(2):579, 1969.

69-2314 THE EFFECT OF ANTIGENIC STIMULATION ON THE INDUCTION OF PLASMA CELL TUMORS IN MICE. (E.) Paraskevas, F. (U. Manitoba, Winnipeg, Canada). Fed. Proc. 28(2):554, 1969.

69-2315 EARLY EFFECTS OF PHENOBARBITAL (PB) AND 3-METHYLCHOLANTHRENE (MC) ON RNA TRANSCRIPTION IN RAT LIVER. (E.) Wold, J. W. (U. Iowa, Iowa City) and W. J. Steele. Fed. Proc. 28(2):484, 1969.

69-2316 BIPHASIC DECREASE IN RADIOACTIVE HEMOPROTEIN OF THE CO-BINDING PARTICLES: EFFECT OF 3-METHYLCHOLANTHRENE (3-MC). (E.) Levin, W. (Burroughs Wellcome & Co. Inc., Tuckahoe, N. Y.) and R. Kuntzman. Fed. Proc. 28(2):483, 1969.

69-2317 EFFECT OF 3-METHYLCHOLANTHRENE ON URIDINE DIPHOSPHATE GLUCURONYLTRANSFERASE. (E.) Howland, R. D. (San Francisco Med. Ctr., Calif.) and A. Burkhalter. Fed. Proc. 28(2):417, 1969.

69-2318 BIOTRANSFORMATION OF 3-METHYLCHOLANTHRENE; STIMULATION OF ITS OWN METABOLISM. (E.) Bresnick, E. (Baylor U. Coll. Med., Houston, Tex.) and H. Mosse. Fed. Proc. 28(2):417, 1969.

69-2319 ENDOCRINE ALTERATION OF MAMMARY PARENCHYMAL CELL UPTAKE OF CARCINOGEN. (E.) Janss, D. H. (U. Tennessee Med. Units, Memphis) and R. C. Moon. Fed Proc. 28(2):684, 1969.

69-2320 IN VITRO AND IN VIVO STUDIES OF INTESTINAL ABSORPTION OF AROMATIC POLYCYCLIC HYDROCARBON CARCINOGENS. (E.) Rees, E. D. (U. Kentucky Coll. Med., Lexington), P. Mandelstam and J. Lowry. Fed. Proc. 28(2):749, 1969.

69-2321 CHEMOPROPHYLAXIS OF BENZO(RST)PENTAPHENE CARCINOGENESIS BY ORANGE OILS, d-LIMONENE AND d-LIMONENE HYDROPEROXIDE. (E.) Homburger, F. (Bio-Res. Inst., Cambridge, Mass.), A. Treger and E. Boger. Fed. Proc. 28(2):749, 1969.

69-2322 REPRESSION OF BENZO(α)PYRENE TUMORIGENESIS IN HAMSTERS BY PRETREATMENT WITH CELLS INFECTED OR TRANSFORMED BY TYPE 12 ADENOVIRUS. (E.) Pinkerton, H. (St. Louis U. Sch. Med., Mo.) and P. I. S. Liu. Fed. Proc. 28(2):750, 1969.

69-2323 EPITHELIAL-MESENCHYMAL INTERACTIONS ASSOCIATED WITH MALIGNANT TRANSFORMATION. (E.) Koprowska, I. (Hahnemann Med. Coll., Philadelphia, Pa.) and H. Y. Park. Fed. Proc. 28(2):750, 1969.

69-2324 EFFECT OF ALBUMIN ON THE HYDROOXYLATION OF 3,4-BENZPYRENE (BP) BY RAT LIVER MICROSOMES. (E.) Alvares, A. P. (Burroughs Wellcome & Co., Inc., Tuckahoe, N. Y.), G. Schilling and A. Garbut. Fed. Proc. 28(2): 483, 1969.

69-2325 EFFECT OF MORPHINE SULFATE ON CELLS OF GLIOBLASTOMA STRAIN IN TISSUE CULTURE. (E.) Liss, L. (Ohio State U. Coll. Med., Columbus) and E. Subko. Fed. Proc. 28(2):803, 1969.

69-2326 INHIBITORY EFFECT OF URINARY ASCORBATE ON TUMOR FORMATION IN MICE BLADDERS IMPLANTED WITH PELLETS CONTAINING 3-HYDROXYANTHRANILIC ACID. (E.) Pipkin, G. E. (Tulane U. Sch. Med., New Orleans, La.), J. U. Schlegel, R. Nishimura and G. N. Shultz. Fed. Proc. 28(2):889, 1969.

69-2327 THE METABOLISM OF THE 8-METHYL ETHER OF XANTHURENIC ACID (XAE) IN RABBITS. (E.) Lower, G. M., Jr. (U. Wisconsin Med. Sch., Madison) and G. T. Bryan. Fed. Proc. 28(2): 873, 1969.

69-2328 STUDIES ON INHIBITION OF HORMONE INDUCTION OF TRYPTOPHAN OXYGENASE BY THIOACETAMIDE. (E.) Kizer, D. E. (Samuel Roberts Noble Found., Ardmore, Okla.), B. Cox and B. C. Shirley. Fed. Proc. 28(2):867, 1969.

69-2329 CASE OF OCCUPATIONAL ARSENICAL KERATOSIS. (Hun.) Valér, M. and A. Gulbert. Börgyógyászati Vener. Szemle 45(3):135-137, 1969.

69-2330 FUNGAL SEPSIS ASSOCIATED WITH BENZENE-INDUCED LEUKEMIA WITH CHROMOSOMAL CHANGES. (Ger.) Hartwich, G. (U. Erlangen-Nürnberg, Germany) and K. T. Schricker. Fortschr. Med. 87(13):563-565, 1969.

69-2331 CHROMOSOMAL ABERRATIONS IN BENZENE-INDUCED LEUKEMIA. (Ger.) Hartwich, G. (U. Erlangen-Nürnberg, Germany), G. Schwanitz and J. Becker. Deut. Med. Wschr. 94(23): 1228-1229, 1969.

69-2332 A MICROSOME-DEPENDENT BINDING OF BENZO(a)PYRENE TO DNA. (E.) Gelboin, H. V. (NCI, Bethesda, Md.). Cancer Res. 29(6):1272-1276, 1969.

69-2333 APPEARANCE OF 3,4-BENZPYRENE IN SEVERAL TYPES OF MURINE PHYTOPLANKTON CULTIVATED IN VITRO. EVENTUAL ROLE OF ASSOCIATED BACTERIA. (Fr.) Niaussat, P. (57 rue Cuvier, Paris), L. Mallet and J. Ottenwaelder. C.R. Acad. Sci. [D] (Paris) 268(17):1109-1112, 1969.

See also abstract nos.: 2205,2206,2207,2208,2209,2231,2314,2397,2439,2478

69-2334 A NEW TRANSMISSIBLE DISEASE IN THE SOUTH AFRICAN CLAWED TOAD, *Xenopus laevis*. (E.) Ruben, L. N. (Reed Coll., Portland, Ore.), M. Balls, J. Stevens and N. S. Rafferty. *Oncology* 23(3):228-237, 1969.

A spontaneous lymphosarcoma (morphologically different from other amphibian lymphosarcomas), involving the external nares of an adult female toad (*Xenopus laevis laevis*), was studied. Cellular suspensions of this tumor and other host tissues induced lymphosarcomas of the same type (at the inoc. site and in the liver, spleen and kidneys) in immature, post-metamorphic adult *Xenopus* and in young adult newts (*Triturus viridescens*). The tumor could also be induced by cell-free supernatant fluids. Tumor tissue from the original host contained acid-fast bacteria, but cultures of these bacteria did not induce tumors (or even a granulomatous reaction) in *Triturus*. No colonies of bacteria or fungi developed in cultured supernatant fluids from this tumor. Preliminary studies using ceramic bead column chromatography suggested that the agent could pass a pore size of 1500 Å, but not of 1000 Å or less (suggesting that it is not a bacterial or fungal product). The agent retained its infectivity after more than 1 yr. of storage at -20° C, and is now stored at -70° C.

69-2335 ESTABLISHED CELL LINE (ICI 101) OBTAINED FROM FROZEN HUMAN LYMPHOBLASTIC LEUKAEMIA CELLS: MORPHOLOGICAL AND IMMUNOLOGICAL COMPARISON WITH THE PATIENT'S FRESH CELLS. (E.) Belpomme, D. (Paul Brousse Hosp., Villejuif, France), G. Seman, J.-F. Dore, A.-M. Venuat, L. Berumen, C. Le Borgne De Kaouel and G. Mathé. *Europ. J. Cancer* 5(1):55-59, 1969.

A permanent lymphoblastic cell line (ICI 101) was obtained from the blood taken from a child with acute lymphoblastic leukemia (in relapse), and stored at -70° C. Virus particles, similar to mouse leukemia viruses, were found in the fresh cells and in samples from the cultures. Antigenic activity of the lymphoblasts was present in the cultured cells, as demonstrated by immune adherence with the child's serum. The antigenicity of the cultured cells was greater than that of the fresh cells (in immune adherence and fluorescence). Frozen storage (-70° C) did not present an obstacle to the establishment of a permanent cell line.

69-2336 CHARACTERIZATION OF TWO BALB/c INFANT THYMUS CELL LINES INFECTED WITH LYMPHOLEUKEMOGENIC VIRUS. (E.) Tennant, J. R. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.). *J. Nat. Cancer Inst.* 42(5):739-748, 1969.

Two morphologically distinct cell culture lines, derived from infant BALB/c thymus admixed with the lympholeukemogenic B/T-L virus, produced large amounts of virus, without a cytopathic effect; in both cell lines, the leukemogenicity of the virus produced was markedly attenuated. Line A cells (probably derived from the thymic parenchyma) were rapidly growing, epithelioid and hyperchromic; they were polyploid but showed no structural chromosomal abnormalities, and they were easily transplantable to isogeneic mice (producing malignant spindle and giant cell tumors at the site of inj.). Line D cells (probably derived from the supporting connective tissue) were slow growing, fibroblastic and hypochromic; they were initially diploid (with a metacentric chromosome marker), but 25% of the cells were polyploid by passage 25. These cells could not be transplanted to isogeneic mice.

69-2337 VERTICAL TRANSMISSION OF MURINE LEUKEMIA VIRUS. (E.) Buffett, R. F. (Roswell Park Mem. Inst., Buffalo, N. Y.), J. T. Grace, Jr., L. A. DiBerardino and E. A. Mirand. *Cancer Res.* 29(3):588-595, 1969.

The 334C mouse leukemia virus (cell-free filtrates from virus-induced leukemic mouse tissues) was inj. s.c. into 250 newborn-2-day-old Ha/ICR Swiss mice, and the frequency of leukemia in their offspring (after mating with either infected or non-infected animals) was determined. The incidence was low in the offspring of infected males and non-infected females (3% in the first litter); in offspring of infected females it was as high as in females inoc. at birth (69% and 70% resp.). Mice born of non-infected mothers, foster-nursed by infected females, showed a leukemia incidence of 62%. In newborn mice, s.c. inoc. of blood, tissues (10% filtrate) and milk (from stomachs of suckling offspring) from adult, nonleukemic, neonatally infected mice induced leukemia in 77, 58 and 63% resp.; filtrates of saliva (50%), urine (50%) and feces (10%) from these adults induced leukemia in 4%, 7%, and 15%, resp.; filtrates of semen (50% original conc.) induced leukemia in 49%, indicating a possibility of paternal transmission.

69-2338 VERTICAL TRANSMISSION OF MURINE LEUKEMIA VIRUS THROUGH SUCCESSIVE GENERATIONS. (E.) Buffett, R. F. (Roswell Park Mem. Inst., Buffalo, N. Y.), J. T. Grace, Jr., L. A. DiBerardino and E. A. Mirand. *Cancer Res.* 29(3):596-602, 1969.

The 334C mouse leukemia virus, obtained from Hauschka ICR (Ha/ICR) Swiss mice, was inj. s.c. into 9 newborn female Ha/ICR Swiss mice, which were mated at age 2 mo. to uninfected males. The offspring were left untreated and mated to normal males; vertical transmission of virulent virus (as determined by leukemia development) was studied through 5 generations of females. A gradual increase in the leukemia incidence (78% to 88%) and a decrease in the period prior to death from leukemia (from an av. of 231 to 210 days) was seen during these 5 generations. The virus was transmitted to the offspring even when the mothers were not leukemic during the suckling period. Infection with the virus and the subsequent development of leukemia did not affect the ability to mate and deliver litters, but early mortality was relatively high in the litters. Filtrates from leukemic tissues from mice of generations 4 and 5, inoc. into newborn Swiss mice, caused leukemia in 80-90% after an av. latent period of 5 mo. Mouse leukemia virus particles (identical to those inj. at birth) were seen in bone marrow and spleen from females of generation 6.

69-2339 INTERFERON AND HOST RESISTANCE TO RAUSCHER VIRUS-INDUCED LEUKEMIA. (E.) Glasgow, L. A. (U. Rochester Sch. Med. Dent., N. Y.) and S. B. Friedman. J. Virol. 3(2): 99-105, 1969.

High serum levels of interferon (150-2000 U/ml) were found in mature random-bred CD-1 mice resistant to Rauscher leukemia virus (RLV), in contrast to low levels (less than 20-200 U/ml) in RLV-susceptible 21-day old BALB/c mice. Intermediate degrees of RLV susceptibility and of interferon production were observed in the F_1 hybrids of these 2 strains, suggesting a causal relationship between interferon production and host resistance to RLV. When high doses (6000 U) of interferon were admin. to suckling CD-1 mice within 48 hr. after RLV infection, leukemia mortality during the 3-mo. observation period was lower than in controls.

69-2340 SPONTANEOUS REGRESSION IN VIRUS-INDUCED MURINE LEUKEMIA. I. HOST-VIRUS SYSTEM. (E.) Rich, M. A. (Albert Einstein Med. Center, Phila.), R. Siegler, S. Karl and R. Clymer. J. Nat. Cancer Inst. 42(4):559-569, 1969.

In 4-5-wk.-old male Swiss or DBA/2 mice (but not BALB/c mice), inoc. of the FV 606 strain of Friend leukemia virus (FLV) caused a self-limiting, regressing leukemia. The infection progressed for about 21 days, but both virus proliferation and spleen wt. decreased steadily after 25-50 days. In 1 experiment, 142/206 mice inoc. with FV 606 were alive after 200 days (compared to 2/100 mice inoc. with conventional FLV). FV 606 continued to induce regressing leukemia through 7 passages. Another FLV strain (FV 642) also induced regressing leukemia, but 8 other FLV strains did not.

69-2341 SPONTANEOUS REGRESSION IN VIRUS-INDUCED MURINE LEUKEMIA. II. INFLUENCE OF ENVIRONMENTAL FACTORS. (E.) Rich, M. A. (Cancer Res. Inst., New Eng. Deaconess Hosp., Boston, Mass.), R. Clymer and S. Karl. J. Nat. Cancer Inst. 42(4):571-577, 1969.

The spontaneous regression observed in 71% of 630 weanling ICR/Ha Swiss mice inoc. with the FV 606 strain of Friend mouse leukemia virus, was thought to be at least partly controlled by the viral genome. The absence of regression observed in 29% was attributed to an altered host response. It is suggested that at least 2 determinants influence the occurrence of spontaneous regression: infection by a specific viral genome, and the presence of appropriate environmental factors (host age, host strain sensitivity, virus titer).

69-2342 ENHANCEMENT OF SPLEEN FOCUS FORMATION AND VIRUS REPLICATION IN FRIEND VIRUS-INFECTED MICE. (E.) Steeves, R. A. (Roswell Park Mem. Inst., Buffalo, N. Y.), E. A. Mirand, S. Thomson and L. Avila. Cancer Res. 29(5): 1111-1116, 1969.

Admin. of Newcastle disease virus (NDV), i.v. admin. of the lactic dehydrogenase-elevating virus (LDV), hypoxia or i.p. admin. of erythropoietin to 4-8-wk.-old SIM/McK or Ha ICR mice, 48 hr. before i.v. infection with spleen focus-forming virus (SFFV) of the Friend virus complex, significantly enhanced spleen focus formation. No enhancement was seen when NDV or LDV were admin. simultaneously with or 5 days before SFFV infection. Sublethally irradiated mice (400 r), inoc. i.p. with *Salmonella typhosa* endotoxin (25 μg) and infected 4 days later with SFFV, produced almost 30 times as much virus/spleen as controls. Spleen cells from irradiated, endotoxin-treated mice, when incubated *in vitro* with SFFV and inj. into supralethally irradiated mice (850 r), produced 10 times as much virus as control preparations in normal mice. It is suggested that these treatments increase the number or susceptibility of target cells (probably primitive erythroid, possibly erythropoietin-sensitive cells) for SFFV.

69-2343 CLONAL ANALYSIS OF FRIEND VIRAL LEUKEMIA CELLS *IN VITRO*. II. INCREASE OF VIRUS PRODUCTION IN LONG-TERM CULTURED CLONAL SUBLINES. (E.) Oboshi, S. (Nat. Cancer Ctr. Res. Inst., Tokyo), T. Seido and M. Katagiri. Gann 60(1):107-114, 1969.

Friend leukemia virus (FLV) production was followed for over 250 days in 8 selected, originally low-titer clonal sublines. Although all cell lines had low FLV titers up to 50 days after isolation, 7/8 showed a marked increase in virus titer 140 days or more after isolation. Second cloning from these sublines resulted in a variety of infectivity (determined after i.p. inoc. of lysates into mice, according to spleen wt. and histological evidence of virus infection). Sublines of increased virus infectivity were isolated from low-virus-producers; selective cloning and serial passage of cells of an extremely low-virus-producing subline resulted in a high-virus-producing cell line. The presence of minute amounts of viral antigen in a low-titer subline was demonstrated by virus neutralization tests, using antisera from immunized Donryu rats. It is concluded that FLV cells are essentially homogeneous in virus production.

69-2344 PROPERTIES OF 5'- PHOSPHORIBOSYL-PYROPHOSPHATE AMIDOTRANSFERASE IN VIRUS INDUCED MURINE LEUKEMIA. (E.) Reem, G. H. (New York U. Sch. Med., N. Y.) and C. Friend. Biochim. Biophys. Acta 171(1):58-66, 1969.

This enzyme (isolated from the spleens of random-bred female Swiss mice with Friend virus leukemia) requires 2 substrates: 5'-phosphoribosyl pyrophosphate as a phosphoribosyl donor and a nitrogen group as a source of the amino group of 5'-phosphoribosylamine. Ribose-5-phosphate was not capable of replacing the 5'-phosphoribosyl pyrophosphate, but NH_4Cl, $(NH_4)_2SO_4$ and glutamine were able to function as amino donors. The enzyme was sensitive to inhibition by purine ribonucleotides; competitive inhibition was observed with 5'-ribosyl pyrophosphate and glutamine; and non-competitive inhibition with NH_4Cl.

69-2345 INCREASE OF THE LEUKEMOGENIC ACTIVITY OF THE FRIEND VIRUS AFTER PRECIPITATION BY POLYETHYLENE GLYCOL. (Fr.) Jasmin, C. (Inst. Cancerol. Immunogen., Villejuif, France), J.-C. Chermann, C. Piton, G. Mathé and M. Raynaud. C.R. Acad. Sci. [D] (Paris) 268(5):876-878, 1969.

The leukemogenic activity of Friend leukemia virus (FLV; precipitated by polyethylene glycol carbowax 6000 prior to suspension in an isotonic solution of phosphate buffer, pH 6.8) was determined by i.p. inoc. of 10-fold dilutions into 2-mo.-old BALB/c mice, and determination of the 50% spleen dose (SD_{50}) 21 days later. The ratio of the total leukemogenic activity of the FLV in the redissolved precipitate to the activity of the supernatant of the original spleen homogenate, ranged from 1.5:1 to 333:1. It is suggested that an inhibitor present in the original preparation was eliminated by the precipitation process, or that the infective activity of FLV was enhanced by the action of polyethylene glycol (without increasing the number of viral particles), or that the number of infective particles was increased by dispersion of clumps of virus particles.

69-2346 MODIFICATION IN GROWTH OF TRANSPLANTABLE RAT TUMORS EXPOSED TO FRIEND VIRUS. (E.) Kobayashi, H. (Hokkaido U. Sch. Med., Sapporo, Japan), F. Sendo, T. Shirai, H. Kaji, T. Kodama and H. Saito. J. Nat. Cancer Inst. 42(3):413-419, 1969.

Three transplantable rat tumors, 2 from spontaneous tumors (WST-5 spindle cell sarcoma; and Takeda undifferentiated sarcoma) and 1 tumor induced by 4-nitroquinoline-N-oxide (DLT undifferentiated squamous cell carcinoma of the lung) were exposed to Friend leukemia virus (FLV) in vivo (i.p. passage for 9 days in leukemic dd/Om mice, or placing with FLV in diffusion chambers implanted into leukemic mice for 7 days). When FLV-exposed WST-5 cells were inoc. s.c. into Wistar/Mk rats, none of the rats died (compared to 4/4 inoc. with unexposed WST-5 cells) and the tumors regressed. FLV inhibition of exposed Takeda cells (inoc. i.p. into Donryu rats) was less marked, since these tumors caused early death. The lethal growth of exposed DLT cells (inoc. s.c. into Donryu rats) was also inhibited; 0/6 died (compared to 6/6 controls). When exposed WST-5 cells were inoc. into FLV-conditioned Wistar/Mk rats (inoc. i.p. with live FLV suspension 48 hr. after birth), they grew well and caused death in 7/8 (compared to 0/11 control rats). Since electron microscopic examination revealed FLV particles on the surfaces of tumor cells, and FLV-exposed tumor cells were stained by fluorescent FLV immune serum, it is concluded that the presence of FLV antigen on the surfaces rendered the rat tumor cells susceptible to immunological rejection.

69-2347 STUDIES ON THE RELATIONS BETWEEN VIRUS RELEASE AND CELLULAR IMMUNOSENSITIVITY IN MOLONEY LYMPHOMAS. (E.) Fenyö, E. M. (Karolinska Inst., Stockholm), P. Biberfeld and E. Klein. J. Nat. Cancer Inst. 42(5): 837-855, 1969.

The cells of the immunoresistant subline (YAC-IR) of the immunosensitive Moloney mouse lymphoma YAC were resistant to the cytotoxic effect of Moloney-specific antiserum. Their Moloney-specific cell surface antigen conc. was 10-fold less than that of YAC; electron microscopic examination of the YAC-IR cells showed approx. 10% of the budding and extracellular Type C particles observed in YAC cells. Bioassay of culture fluid after a short incubation in vitro confirmed that the YAC-IR cells released less virus and indicated a correlation between surface budding and antigenicity. The leukomogenic activity of the virus released from these 2 lymphomas was the same when 5×10^6 irradiated cells (6000 r) were inoc. i.p. into newborn A/Sn and A.BY mice, as was the antibody response when these cells were inoc. into adult $(A \times C57BL)F_1$ mice. The YAC-IR line became sensitive to the cytotoxic action of Moloney-specific antiserum after 3 passages through A/Sn mice neonatally infected with YAC-derived virus, but remained resistant when passaged in hosts infected with YAC-IR derived virus. The sensitivity of YAC cells was maintained when passaged through YAC-IR infected hosts.

69-2348 LOCALIZATION OF IMMUNOGLOBULIN AND VIRAL ANTIGEN IN RATS INFECTED WITH MOLONEY VIRUS. (E.) Cremer, N. E. (California State Dept. Health, Berkeley), D. O. N. Taylor and E. H. Lennette. J. Nat. Cancer Inst. 42(5): 695-708, 1969.

Inbred Osborne-Mendel rats, inoc. i.p. with different dilutions of Moloney leukemia virus (preparation RT34) at age 24-72 hr. (and 36 non-infected controls) were hyperimmunized with bovine serum albumin (BSA). Fluorescent antibody staining to detect anti-BSA antibody (rhodamine tag) and viral antigen (fluoresce in tag) showed that the popliteal and lumbar lymph nodes were the main antibody-producing sites in both groups of rats. In control and infected rats, antibody was produced by the same types of mature (plasma) and immature (plasmablast or lymphoblast) cells. Some cells contained both antibody and viral antigen while others contained only antibody or antigen. The cells intermingled; no discrete clones of either antibody- or antigen-producing cells were detected. Serum conc. of γ-globulin and the passive hemagglutinin titers were substantially lower in infected rats than in controls. A correlation between the percentage of cells staining for viral antigen and the percentage of organs with lymphoma was noted. The highest percentage of cells showing viral antigen was usually found in the thymus (75% of the cells).

69-2349 BIOLOGIC STUDIES ON HAMSTER TUMORS INDUCED BY THE MURINE SARCOMA VIRUS (MOLONEY). (E.) Perk, K. (NCI, Bethesda, Md.), M. V. Viola, K. L. Smith, N. A. Wivel and J. B. Moloney. Cancer Res. 29(5):1089-1102, 1969.

In newborn golden Syrian hamsters, inoc. of Moloney sarcoma virus preparations of mouse (BALB/c) or rat (Osborne-Mendel) origin induced undifferentiated sarcomas, which did not regress, formed metastases and caused death (7-9 mo. after infection) in all recipients. Cell-free extracts of the induced hamster sarcomas were oncogenic for newborn hamsters; their malignancy increased progressively with consecutive passage (the latent period decreased from 31 wk. to 11 wk.), but they did not induce sarcomas in mice or rats. The primary hamster tumor induced by the mouse-derived virus was transplantable into newborn and weanling hamsters (the tumor incidence was 100% in each transplant generation); no tumor regression was seen through 27 whole-cell transplant generations, and the degree of malignancy increased progressively. It was possible to recover the mouse sarcoma genome by cocultivation of hamster tumor cells with Moloney leukemia virus in vivo (BALB/c mice), or with mouse embryo cells and Rauscher leukemia virus in vitro. Negatively stained conc. cell-free preparations of the hamster tumor revealed a few Type C particles, but no virus particles were found in thin sections of cells or in extracellular spaces.

69-2350 INCREASED TUMORIGENESIS OF MURINE SARCOMA VIRUS (MOLONEY) BY COINFECTION WITH RAUSCHER VIRUS OR BY TREATMENT WITH ANTI-LYMPHOCYTE SERUM. (E.) Hook, W. A. (Nat. Inst. Dent. Res., Bethesda, Md.), M. A. Chirigos and S. P. Chan. Cancer Res. 29(5):1008-1012, 1969.

A high incidence of tumor regression was seen (2-3 wk. after inj.) when 4-6-wk.-old male BALB/c mice were inoc. i.m. with Moloney mouse sarcoma virus (MSV) alone. Pretreatment with Rauscher leukemia virus (RLV; i.p.), 5 days before MSV, resulted in a marked decrease in MSV neutralizing antibody levels (23-42 days after infection) and enhanced tumor growth. Multiple inj. of rabbit antilymphocyte serum (ALS) into MSV-inoc. mice had a similar effect on tumor growth; early death was seen in both RLV- and ALS-treated mice. Multiple inj. of normal rabbit serum, unexpectedly, also caused some enhancement of tumor growth. Infection with RLV and MSV had a significant immunosuppressive effect (as measured by the antibody response to sheep RBC), while admin. of MSV alone did not. The IgG and IgM levels in the RLV- and MSV-infected mice were either equal or slightly increased (compared to controls), indicating that immunosuppression did not result from depletion of serum IgG or IgM levels. It is concluded that antibody suppression contributed to the increased growth of MSV tumors.

69-2351 THE EFFECT OF INTERFERON ON FOCUS FORMATION AND YIELD OF MURINE SARCOMA VIRUS IN VITRO. (E.) Fitzgerald, G. R. (St. Jude Child. Res. Hosp., Memphis, Tenn.). Proc. Soc. Exp. Biol. Med. 130(3):960-965, 1969.

Cell cultures of mouse embryo fibroblasts, chick embryo fibroblasts and JLS-V9 cells (mouse bone marrow), when treated with interferon, produced less Moloney mouse sarcoma virus and were less susceptible to focus formation than untreated cells or cells treated with normal mouse serum. The protective effect of interferon was insignificant after 24 hr.

69-2352 INHIBITORY EFFECT OF IMMUNE SERUM ON CARCINOGENESIS IN MICE NEONATALLY INFECTED WITH MURINE SARCOMA VIRUS (HARVEY). (E.) Bubeník, J. (Inst. Exp. Biol. Genet., Prague) and A. Turano. Folia Biol. (Praha) 14(6):433-439, 1968.

Two immune sera, prepared by immunization of inbred mice (C57BL/6, C57BL/10Sn, A/L) with irradiated tissue from tumors (MSVT 13) induced by the Harvey mouse sarcoma virus (HSV), contained antibodies capable of neutralizing HSV. The sera were not cytotoxic to cells of HSV-induced sarcomas, but results of indirect immunofluorescence tests were positive. Repeated inj. of these sera into mice inoc. neonatally with conc. HSV inhibited HSV carcinogenesis, even if this treatment was begun 1-5 days after HSV inoc. It is suggested that this inhibitory effect may result from the presence of virus-neutralizing antibodies, which can neutralize the virus produced by the infected cells and prevent the infection of further cells.

69-2353 VIRUS PARTICLES ASSOCIATED WITH THE TRANSPLANTABLE NOVIKOFF HEPATOMA IN THE RAT. (E.) Karasaki, S. (U. Montreal, Canada). Cancer Res. 29(6):1313-1315, 1969.

Type C virus-like particles (resembling mouse and avian leukosis-sarcoma viruses) were found in close association with the plasma membrane of transplantable rat Novikoff hepatoma cells.

69-2354 DEMONSTRATION OF AMV-TYPE VIRUS PARTICLES IN A TRANSPLANTABLE HAMSTER TUMOR (HP). (Fr.) Delain, E. (Gustave-Roussy Inst., Villejuif/Seine, France), O. Weiler and F. Lacour. C.R. Acad. Sci. [D] (Paris) 268(4): 744-747, 1969.

A transplantable tumor (designated HP) was induced in IGR strain inbred albino hamsters by inoc. of cells from a chicken bearing avian myeloblastosis virus (AMV)-induced leukemia. Up to passage 6, the hamster tumors resulting from i.v., i.p. or s.c. inoc. of cells from this tumor (or inoc. of ascitic fluid, whole blood or plasma from tumor-bearing animals) showed virus particles apparently identical with AMV, as did s.c. and abdominal metastases, ascitic fluid, and specimens of infiltrated liver, kidney, bone marrow and seminal vesicles. No virus particles were demonstrated in non-tumor-bearing animals (same strain), or in hamsters bearing either spontaneous tumors or a transplanted melanoma. When cells from this transplantable tumor were mixed with chick embryo cells and inoc. into chickens, they induced nephroblastomas containing large numbers of mature AMV particles.

69-2355 PRESENCE OF VIRAL PARTICLES RESEMBLING NUCLEOCAPSIDS, ASSOCIATED WITH THE MITOCHONDRIA OF HAMSTER CELLS TRANSFORMED BY ROUS VIRUS. (Fr.) Gazzolo, L. (Int. Cancer Res. Ctr., Lyon, France), G. De-Thé, P. Vigier and P. S. Sarma. C.R. Acad. Sci. [D] (Paris) 268(12):1668-1670, 1969.

Clone 2 cells, from a hamster sarcoma induced by Rous sarcoma virus (RSV; Schmidt-Ruppin strain) were examined under the electron microscope after 4 days of in vitro cultivation. A majority of the cells showed "nucleocapsid" structures of viral origin, closely associated with the mitochondria (some were in immediate contact with the mitochondrial membranes; others were enclosed within the mitochondrial matrix and surrounded by membranes of apparently mitochondrial origin). The particles were morphologically different from particles found in BHK 21 cells, extracellular Type C particles seen in spontaneous hamster tumors, or particles found in RSV (Schmidt-Ruppin strain)-transformed rat tumor cells; they resembled the nucleocapsids of the avian RNA-containing leukosis-sarcoma viruses. Cells containing these particles showed high levels of GS antigen; the particles themselves were not examined for the presence of GS antigen.

69-2356 INTERACTION OF ROUS SARCOMA VIRUS WITH RAT EMBRYO FIBROBLASTS OF INBRED LEWIS STRAIN IN VITRO. (E.) Veselý, P. (Inst. Exp. Biol. Genet., Czechoslovak Acad. Sci., Prague), L. Donner, J. Činátl and V. Sovová. Folia Biol. (Praha) 14(6):457-465, 1968.

Spontaneously transformed embryonic fibroblasts from inbred Lewis rats (LWF-1 cells), cocultivated with virus-producing chicken cells infected with Rous sarcoma virus (RSV; Schmidt-Ruppin strain) caused virogenic tumor transformation of rat cells (RSL mix-2). Both clones isolated from the transformed population contained the RSV genome (because they induced Rous sarcomas in chickens). Virogenic tumor transformation of rat cells (RSL-38) was obtained by infection of the LWF-10 cell line (rat embryo fibroblasts) with a native cell-free preparation of RSV (Schmidt-Ruppin) with added rat RBC. When the established LWF-13 cell line (rat embryo fibroblasts) was cocultivated with chicken cells producing RSV (Prague strain), the resulting population of transformed cells contained 2 clones: clone RPL mix-1A/K4, which induced Rous sarcomas in chickens and contained RSV group specific (Gs) antigen, and clone RPL mix-1/K1, which did not induce Rous sarcomas in chickens and contained neither Gs nor complement-fixing antigens.

69-2357 USE OF THE NUCLEIC ACID HYBRIDIZATION METHOD FOR THE DEMONSTRATION OF DNA HOMOLOGOUS TO ROUS VIRUS RNA IN RSV-TRANSFORMED MAMMALIAN CELLS. (E.) Rakušanová, T. (Inst. Exp. Biol. Genet., Prague). Folia Biol. (Praha) 15(2):96-103, 1969.

No differences were observed in hybridization of the heavy (65 S) RNA fraction of Rous sarcoma virus (RSV) with the DNA of transformed and nontransformed chicken and mammalian (rat) cells. RSV RNA contained sequences similar to those seen in normal chick fibroblast DNA and normal mammalian cell DNA. The occurrence of common DNA sequences in mammalian and chick fibroblasts remained unchanged after RSV transformation.

69-2358 PRODUCTION OF ACID MUCOPOLYSACCHARIDES IN MAMMALIAN FIBROBLAST TISSUE CULTURES TRANSFORMED BY ROUS SARCOMA VIRUS. (E.)

Rakušanová, T. (Inst. Exp. Biol. Genet., Prague). *Folia Biol.* (*Praha*) 15(2):87-95, 1969.

Production of acid mucopolysaccharides (hyaluronic acid) by Rous sarcoma virus (RSV)-transformed mammalian (rat or hamster) fibroblasts *in vitro* was equal to or less than that observed with normal or spontaneously transformed fibroblasts. The LWF rat tumor (induced by spontaneously transformed cells) contained 10 times as much acid mucopolysaccharide as the XC rat tumor (RSV-induced). Acid mucopolysaccharide production in chicken cells was higher in RSV-transformed cells than in non-infected cells.

69-2359 MULTIPLE GROUP-SPECIFIC ANTIGEN COMPONENTS OF AVIAN TUMOR VIRUSES DETECTED WITH CHICKEN AND HAMSTER SERA. (E.) Armstrong, D. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.). *J. Virol.* 3(2):133-139, 1969.

The multiple group-specific (gs) antigen components of avian myeloblastosis virus (BAI strain A), Marek's disease virus (strain JM) and 7 strains of Rous sarcoma virus (RSV; including the Hanafusa RAV-1 strain) were studied by immunodiffusion (Ouchterlony), using sera from adult chickens immunized with these viruses and sera from hamsters with RSV-induced tumors. The hamster sera detected up to 4 gs antigen components of the avian leukosis-sarcoma viruses, while adult chicken sera detected at least 1 component. A single antigen was identified by both sera. Freezing and thawing released these components from the virion. Neither immunodiffusion nor complement fixation tests demonstrated any gs antigen components in normal chicken tissues, or tissues from chickens infected with Marek's disease virus.

69-2360 HEMORRHAGIC LESIONS PRODUCED BY CLAUDE'S CHICKEN TUMOR-10 VIRUS. (E.) Pearson, J. W. (NCI, Bethesda, Md.) and V. Groupé. *J. Nat. Cancer Inst.* 42(5):723-732, 1969.

Large doses ($10^{2.5}$ ED_{50}) of Claude's chicken tumor-10 virus (CTV-10), inoc. s.c. into wing webs of 3-day-old unsexed White Leghorn chicks, induced invasive, non-metastasizing sarcomas at the inoc. site after 4-12 days. Vascular cysts were also noted in the viscera, heart and breast muscles. Chorioallantoic membrane (CAM) inoc. of CTV-10 into 9-10-day-old White Leghorn embryos produced large red pocks (composed of areas of ectasia and hemorrhagic cysts), small white pocks (focal carcinosarcomas with epithelial pearls) and mixed red and white pocks on the CAM; the red and white pocks appeared 4 and 7 days after CTV-10 inoc., resp. The total number of induced CAM pocks was related to the dilution of CTV-10 inoc. When well-isolated pocks were inoc. s.c. into chickens after 5 CAM passages, they induced typical CT-10 tumors. Neutralizing antibodies were demonstrated in convalescent and hyperimmune sera of chicks inoc. with CTV-10. Cross-neutralization tests revealed an antigen common to CTV-10 and the Bryan strain of Rous sarcoma virus (RSV). Chicken antiserum against CTV-10 neutralized both CTV-10 and RSV, but turkey RSV antiserum neutralized only the homologous RSV. Adsorption of CTV-10 immune serum with RSV reduced its neutralizing index.

69-2361 MAMMARY TUMOR VIRUS ANTIGEN: SENSITIVE IMMUNOASSAY. (E.) Sibal, L. R. (NCI, Bethesda, Md.), W. F. Feller, M. A. Fink, B. E. Kohler, W. T. Hall and H. E. Bond. *Science* 164(3875):76-78, 1969.

A passive hemagglutination inhibition (HAI) test, using standardized antisera prepared in rabbits or rhesus monkeys and sensitized sheep RBC, to determine the amount of mammary tumor virus (MTV) antigen in fat-free mouse milk is described. A total of 17 milk samples from different strains of MTV-positive and MTV-negative mice were tested and confirmed the value of this method. The HAI titers were correlated with the precipitin reactions (with monkey antiserum) to MTV and the presence of Type B virus particles (as determined by electron microscopic examination). The assay was highly sensitive; a 1:256 to 1:2048 dilution of skimmed milk containing the antigen inhibited the reaction. The lack of correlation between the mammary tumor incidence and the HAI titer in the highly susceptible C_3H $A^{vy}fB$ mouse strain (90% tumor incidence), indicated that the tumor incidence is determined by genetic susceptibility as well as the amount of MTV present.

69-2362 PROTECTION AGAINST MAMMARY TUMORS IN MICE BY IMMUNIZATION WITH PURIFIED MAMMARY TUMOR VIRUS PREPARATIONS. (E.) Burton, D. S. (U. California, Berkeley), P. B. Blair and D. W. Weiss. *Cancer Res.* 29(4):971-973, 1969.

In BALB/cCrgl female mice, immunized with purified mammary tumor virus (MTV) and challenged 30 days later by s.c. inoc. of 10^4 living isogenic tumor cells, 7/30 developed mammary tumors; in the control group (immunized with Rous sarcoma virus), 10/10 developed tumors. When peritoneal cells from MTV-immunized donors were incubated *in vitro* for 30 min. with tumor cells and the cell mixture was inoc. s.c. into BALB/cf/C3H female mice, suppression of tumors was also seen (tumors developed in 6/22, compared to 9/11 of the controls). In another experiment, immunization with large numbers of irradiated (15,000-17,000 r) tumor cells afforded greater protection in BALB/cf/C3H mice against challenge with living tumor cells than immunization with purified MTV; tumors developed in 2/10 and 21/29, resp. (after 81 days), in mice challenged with 2 x 10^4 cells, and in 2/10 and 23/30, resp., in mice challenged with 8 x 10^4 cells.

69-2363 ENHANCEMENT BY HYPOPHYSEAL HORMONES ON THE MALIGNANT TRANSFORMATION OF TRANSPLANTED HYPERPLASTIC NODULES OF THE MOUSE MAMMARY GLAND. (E.) Dux, A. (Netherlands Cancer Inst., Amsterdam) and O. Mühlbock. Europ. J. Cancer 5(2):191-194, 1969.

When hyperplastic mammary nodules were transplanted into cleared fat pad areas of mammary glands of 21-day-old female $(C_3H \times O_{20})F_1$ hybrid mice (mammary tumor virus-positive), they were transformed more rapidly into carcinomas when pituitary isografts were simultaneously implanted in the same site. This accelerated tumor formation was attributed to local hormonal stimulation.

69-2364 DETECTION OF ANTIBODIES AGAINST THE MAMMARY TUMOR VIRUS WITH THE ANTIGLOBULIN CONSUMPTION TEST. (E.) Holmes, E. C. (NCI, Bethesda, Md.) and D. L. Morton. J. Nat. Cancer Inst. 42(5):733-738, 1969.

Antisera from mammary tumor virus (MTV)-free C3Hf/HeN mice, immunized with RIIIfC3H (MTV-positive) mammary tumors, were tested against 5 different MTV-induced C3H/HeN mammary tumors by the antiglobulin consumption test (AGCT). Absorption ratios were 4:1 for 1/5 tumors, 8:1 for 2 tumors and 32:1 for the other 2 tumors. The AGCT proved consistently useful in the detection of MTV antigen in MTV-induced mammary tumors; it showed that the detected antibody was directed against MTV itself, not against a tumor-specific neoantigen.

69-2365 STUDIES OF THE REGRESSION OF SPONTANEOUS ADENOCARCINOMATA IN MICE. (E.) Strong, L. C. (8533 Sugarman Drive, La Jolla, Calif.). Z. Krebsforsch. 72(1):32-35, 1969.

Inbred mice of the mammary tumor virus-positive C3H/St and C3HB/St strains, bearing spontaneous mammary adenocarcinomas were treated with liver extracts from mice, mastomi South African rat (Rattus natalensis), beef, bull, steer and horn shark. Tumor regression was seen in only 1/69 offspring of untreated controls. Admin. of liver extracts to lactating females inhibited the growth rate of spontaneous tumors in the offspring and increased the percentage of mammary tumor regression (the mean tumor regression was 17.0% in 1 group and 38.4% in another).

69-2366 INDUCTION OF BRAIN TUMORS IN NEWBORN HAMSTERS BY SIMIAN ADENOVIRUS SA7. (E.) Rapp, F. (Baylor U. Sch. Med., Houston, Tex.), S. Pauluzzi, T. A. Waltz, J. A. Burdine, Jr., F. A. Matsen III, and B. Levy. Cancer Res. 29(6):1173-1178, 1969.

Random-bred newborn Syrian hamsters were inoc. intracerebrally with simian adenovirus SA7 (10^6 PFU), which induced brain tumors in 26/118 (24 resembled human medulloblastomas, 2 were glioblastoma multiforme with reticulum formation) within 23-56 days. Immunofluorescence reactions (testing for the presence of antibodies to the SA7 tumor antigen) were negative in the sera of tumor-bearing animals, but complement-fixation reactions for this antigen in brain tumors were positive. The tumor cells had to be cultivated on irradiated feeder layers before in vitro growth could occur. Serial s.c. or intracerebral passage of tumor cells induced the same type of tumor with the same low antigen level. Since the sera of the tumor-bearing hamsters contained no tumor antigen, it is suggested that similarly negative results using sera from pts. with brain tumors may not necessarily exclude the possibility of a viral etiology.

69-2367 EPENDYMOMAS INDUCED IN HAMSTERS INOCULATED WITH AN AVIAN ADENOVIRUS (CELO). (E.) Mancini, L. O. (Union Carbide Res. Inst., Tarrytown, N. Y.), V. J. Yates, V. Jasty and J. Anderson. Nature (London) 222(5189):190-191, 1969.

All 17 newborn hamsters that survived intracerebral inoc. with 0.02 ml of chicken embryo lethal orphan (CELO) virus developed CNS symptoms 44-228 days after inoc. (wt. loss, muscular incoordination, weakness and lethargy); 15/17 developed papillary ependymomas of the lateral ventricles.

69-2368 TRANSFORMATION OF RAT EMBRYO CELLS BY ADENOVIRUS TYPE 1. (E.) McAllister, R. M. (Child. Hosp. L. A., Calif.), M. O. Nicolson, A. M. Lewis, I. MacPherson and R. J. Huebner. J. Gen. Virol. 4(Pt. 1):29-36, 1969.

The MONT strain of adenovirus type 1 (AV-1; from a human lymphoma) transformed primary cultures of embryonic cells from Hooded Lister rats, without causing a CPE. The number of AV-1 particles required to induce 1 focus was about the same as with adenovirus type 12. Adenovirus type 2 (AV-2) was less effective as a transforming virus than AV-1. AV-1-transformed cells contained AV-1-specific tumor antigens and synthesized AV-1-specific RNA, which formed RNase-resistant hybrids with AV-1 DNA. It is suggested that the inability of AV-1- or AV-2-transformed cells to induce tumors in rats may result from production of strong transplantation antigens in the transformed cells, minimizing their chances of initiating a focus of tumor cells.

69-2369 SPECIFIC NUTRITIVE REQUIREMENT OF CHINESE HAMSTER CELLS TRANSFORMED IN VITRO BY ADENOVIRUS 12. (Fr.) Lorans, G. (Inst. Sci. Res., Cancer, Villejuif, France) and C. Brailovsky. C.R. Acad. Sci. [D] (Paris) 268(1):224-226, 1969.

Following in vitro transformation by adenovirus type 12, the Cl. 5-HC-Ad. 12 line of Chinese hamster embryonic cells was no longer able to grow in a standard culture medium (containing calf serum), unless Hb was added with a minimal final conc. of 35 μg/ml medium. The requirement was observed originally in passages 7 and 10; it remained uniform up to passage 50, followed by a progressive diminution of the Hb conc. required, until the phenomenon disappeared at about passage 100. A similar phenomenon could not be demonstrated in cells transformed by other oncogenic viruses or by chemical agents. The Hb requirement seemed to parallel the extent of the mitochondrial aberrations noted in the transformed cells.

69-2370 ISOLATION OF T ANTIGEN FROM SOLID HAMSTER TUMORS INDUCED BY ADENOVIRUS TYPE 31. (E.) Jainchill, J. L. (MAN Prog., Oak Ridge Nat. Lab., Tenn.), E. L. Candler and N. G. Anderson. Proc. Soc. Exp. Biol. Med. 130(3): 770-775, 1969.

Nonvirion T (tumor) antigen isolated from adenovirus type 31-induced solid tumors in randombred Syrian hamsters had a sedimentation coefficient of 2.93 S; it was membrane-associated, partially heat-labile (50% of the complement-fixing activity was destroyed by heating to 56° C for 5 min., while the rest was stable to 1 hr.), and stable at -70° C for at least 3 mo. The antigen had an isoelectric point near pH 4.5 and traveled rapidly in acrylamide gel.

69-2371 CHARACTERISTICS OF THE SYRIAN HAMSTER RIBONUCLEIC ACID PRESENT IN CELLS TRANSFORMED BY POLYOMA, SIMIAN VIRUS 40, OR ADENOVIRUS 12. (E.) Martin, M. A. (NIH, Bethesda, Md.). J. Virol. 3(2):119-125, 1969.

About 5% of Syrian hamster DNA could be saturated (in DNA-RNA saturation-hybridization experiments) by randomly labeled RNA prepared from hamster cells transformed by SV40, polyoma virus (PV) or adenovirus type 12 (AV-12), suggesting that large regions of host cell DNA were not derepressed by the presence of foreign viral DNA. The 3 RNAs were indistinguishable by competition-hybridization experiments, when unenriched pulse-labeled RNA from transformed cells was used as an indicator, but cellular RNA from AV-12-transformed cells could be distinguished from cellular RNAs from PV- and SV40-transformed cells, after enrichment of the labeled RNA by a prior cycle of DNA-RNA hybridization. In this system, cellular RNA's from PV- and SV40-transformed cells could not be distinguished from each other.

69-2372 VIRUS-SPECIFIC NUCLEIC ACIDS IN SV40-EXPOSED HAMSTER EMBRYO CELL LINES: CORRELATION WITH S AND T ANTIGENS. (E.) Levin, M. J. (NCI, Bethesda, Md.), M. N. Oxman, G. Th. Diamandopoulos, A. S. Levine, P. H. Henry and J. F. Enders. Proc. Nat. Acad. Sci. USA 62(2):589-596, 1969.

Of a number of homologous SV40-exposed hamster embryonic cell lines examined for the presence of RNA complementary to SV40 DNA, only those lines containing the SV40 T antigen (but not the SV40 S antigen) possessed such virus-specific RNA. This suggests that the S antigen is not coded for directly by the SV40 genome.

69-2373 CHANGES IN SURFACE ANTIGENS OF SV40-VIRUS TRANSFORMED CELLS. (E.) Robertson, H. T. (Harvard Med., Sch., Boston, Mass.) and P. H. Black. Proc. Soc. Exp. Biol. Med. 130(2):363-370, 1969.

Using heterologous antisera prepared by immunization of young male New Zealand white rabbits with A-8 or 3T3-SV40 cells and immunofluorescent methods, antigenic reactivity characteristic of the Forssman antigen was detected on the surface of hamster cells transformed by SV40, polyoma virus (PV) or an adenovirus type 7-SV40 hybrid, as well as in primary hamster kidney cell cultures maintained in vitro for 7 or 28 days. The staining specificity of the A-8 (BHK-21 newborn hamster kidney cells transformed by SV40 DNA) antiserum was removed by purified Forssman glycolipid, indicating that the only reactivity was against this antigen. Adenovirus type 12-transformed hamster cells, SV40-transformed human cells, and PV- and SV40-transformed mouse cells showed no Forssman reactivity. The possible relationship of antigenic changes taking place on the surface of virus-transformed cells to the normally present surface components is discussed.

69-2374 IMMUNOCHEMICAL CHARACTERIZATION OF PLAQUE MUTANTS OF SIMIAN VIRUS 40. (E.) Ozer, H. L. (NIH, Bethesda, Md.), K. K. Takemoto, R. L. Kirschstein and D. Axelrod. J. Virol. 3(1):17-24, 1969.

The radioisotope precipitation (RIP) and the RIP inhibition tests provided a rapid and sensitive micro method for the detection of antiviral antibodies to SV40. Small quantities of viral antigen could be detected by inhibition of the RIP by unlabeled virus. By this means, the large and small plaque mutants of SV40 were easily distinguishable, since the differences depended on the antigenic characteristics of the specific virion.

69-2375 THE EFFECT OF ACTINOMYCIN D ON THE TRANSCRIPTION AND REPLICATION OF SIMIAN VIRUS 40 DEOXYRIBONUCLEIC ACID. (E.) Carp, R. I. (Inst. Basic Res. Mental Retardation, Staten Is., N. Y.), G. Sauer and F. Sokol. Virology 37(2):214-226, 1969.

Actinomycin D (AD; 0.5 μg/ml) suppressed the synthesis of virus, viral DNA, viral coat protein and "late" virus-specific RNA, but not the synthesis of tumor (T) antigen or early virus-specific RNA, in SV40-infected green monkey kidney cells (primary or continuous culture). AD also decreased the induction of thymidine kinase in this system. It is suggested that some of the RNA hybridizable with SV40 DNA, synthesized in the presence of AD, can act as messenger RNA.

69-2376 ORIGIN OF THE THYMIDINE KINASE INDUCED BY POLYOMA VIRUS IN PRODUCTIVELY INFECTED CELLS. (E.) Basilico, C. (New York U. Sch. Med., N. Y.), Y. Matsuya and H. Green. J. Virol. 3(2):140-145, 1969.

In 3T3 mouse cells, polyoma virus (PV) infection was accompanied by an increase in thymidine kinase (TK) activity. Two lines of 3T3 cells, resistant to 5-bromo-2'-deoxyuridine, were isolated. No increase in TK levels was observed after productive PV infection of these TK$^-$ cells, suggesting that TK is not coded for by a PV gene.

69-2377 REVERSION IN POLYOMA-TRANSFORMED CELLS: RETRANSFORMATION, INDUCED ANTIGENS AND TUMORIGENICITY. (E.) Marin, G. (Int. Lab. Gen. Biophys, Naples) and I. MacPherson. J. Virol. 3(2):146-149, 1969.

The reversion (with potential for retransformation) of polyoma virus (PV)-induced transformation, seen in chromosomal segregants from a "hybrid" clone of BHK21/13 hamster fibroblasts, was attributed to a loss of PV genes from the transformed cells. These cells lost their tumorigenicity; PV-specific complement-fixing antigen was absent, and the induced transplantation antigen was reduced or absent.

69-2378 GROWTH IN VITRO AND ULTRASTRUCTURE OF CELLS FROM A MEDULLARY CARCINOMA OF THE HUMAN THYROID GLAND: TRANSFORMATION BY SIMIAN VIRUS 40 AND EVIDENCE OF THYROCALCITONIN AND PROSTAGLANDINS. (E.) Grimley, P. M. (NCI, Bethesda, Md.), L. J. Deftos, J. R. Weeks and A. S. Rabson. J. Nat. Cancer Inst. 42(4): 663-680, 1969.

Two series of tissue cultures (1 from fresh specimen, the other from frozen samples stored for 8.5 mo.) were initiated from a metastatic nodule of a primary medullary carcinoma of the thyroid from a male pt. After SV40 infection, subcultures of both series showed the characteristics of virus-transformed cells. Radioimmunoassay of culture fluid for thyrocalcitonin (up to 7 mo. after the initiation of monolayers) revealed significant activity (more than 2 mμg/ml in 24 hr.), suggesting net hormone synthesis. After 4 mo., prostaglandins PGE$_2$ and PGF$_{2\alpha}$ were present in fluids from SV40-transformed subcultures. Electron microscopic examination revealed that cytoplasmic secretory granules (abundant in the original cells) disappeared during subculture, and electron-dense secretions accumulated in the dilated cisternae of the ribosome-bound endoplasmic reticulum. Virus-transformed cultures contained many epitheloid cells with filiform surface projections; the relationship of these structures to antigenic changes after transformation is briefly discussed. Amyloid was not detected either in virus-transformed or non-infected subcultures, although it was present in the original tumor stroma and tissue culture explants.

69-2379 NEW NUCLEAR RIBONUCLEIC ACID IN CELL CULTURES INFECTED WITH POLYOMA VIRUS. (E.) Azuma, M. (Hokkaido U. Sch. Med., Sapporo, Japan), J. R. Hodgson, C. Aizawa and H. W. Fisher. J. Virol. 3(2):275-277, 1969.

After infection of mouse embryo cultures with polyoma virus (PV) and exposure to uridine-5-^{3}H in the medium, only 4S RNA was significantly labeled during the first 12 hr.; after 12 hr., new 10S and 20S components appeared and the 16S component was reduced. The new 20S nuclear RNA annealed to at least 17% with PV DNA, but to only 4% with mouse embryo cellular DNA; other RNA's (10S, 35S, 45S and 55S) annealed to PV DNA to 7% or less, but to cellular DNA to at least 20%.

69-2380 POLYOMA VIRUS GENE ACTIVITY DURING LYTIC INFECTION AND IN TRANSFORMED ANIMAL CELLS. (E.) Martin, M. A. (NIH, Bethesda, Md.) and D. Axelrod. Science 164(3875):68-70, 1969.

RNA's labeled with ^{32}P, obtained either from C-57 mouse embryo cells productively infected with polyoma virus (PV) or from PV-induced mouse and hamster tumor cells, were used to measure PV DNA transcription during lytic infection and in transformed cells. An excess of ^{32}P-labeled lytic RNA saturated approx. 50% of the PV DNA. Addition of labeled RNA from transformed hamster cell lines resulted in saturation of 20% of the PV DNA sites. RNA from PV-transformed mouse tumor cells (tumor 923) reduced the PV DNA sites available for reaction with ^{32}P-Cytic RNA from 50% to 40%, indicating that approx. 10% of the PV genome was transcribed in this transformed mouse cell line.

69-2381 GROWTH AND REGRESSION OF RABBIT TUMOURS INDUCED BY POLYOMA VIRUS. (E.) Postlethwaite, R. (U. Aberdeen, Scotland), P. V. Best, I. B. Porteous and D. W. Blair. Brit. J. Cancer 23(1):116-124, 1969.

In newborn rabbits, s.c. inoc. of polyoma virus (PV) induced local tumors, which became palpable after 2-5 wk., increased in size from 5-7 wk., and regressed by 6-12 wk. The tumors consisted of fibroblast-type cells with a characteristically whorled arrangement. Lymphocytic infiltration of regressing tumor nodules suggested a homograft type reaction. Intracerebral (i.c.) inoc. of PV into newborn rabbits induced meningeal tumors histologically similar to the skin tumors, but the latent period for these intracranial tumors was 6-39 wk. The meningeal tumors showed little evidence of an active homograft-type reaction, but regressed or regressing tumor nodules were frequently seen in some animals which showed highly active tumors in other parts of the meninges. When PV was admin. both s.c. and i.c. to newborn rabbits, the incidence of intracranial tumors was less than in rabbits receiving only i.c. inoc. of PV.

69-2382 INDUCTION OF RENAL SARCOMAS IN RATS BY POLYOMA VIRUS. (Ger.) Georgii, A. (U. Munich, Germany), K. Prechtel and H. Zobl. Z. Krebsforsch. 72(1):1-11, 1969.

In non-inbred newborn Wistar rats, s.c. inoc. of polyoma virus (PV) induced mainly highly cellular spindle cell sarcomas of the kidneys, showing only scanty fibrous stroma and multifocal growth. A correlation was seen between the PV dosage and the host response, the percentage of rats developing tumors, the number of sarcomas/kidney and the size and growth rate of the tumors.

69-2383 NEOPLASTIC TRANSFORMATION IN VITRO OF HAMSTER LENS EPITHELIUM BY SIMIAN VIRUS 40. (E.) Albert, D. M. (Armed Forces Inst. Path., Bethesda, Md.), A. S. Rabson, P. A. Grimes and L. Von Sallmann. Science 164(3883): 1077-1078, 1969.

SV40-infected lens epithelium cells from 4-wk.-old Syrian hamsters underwent transformation and contained SV40 "T" antigen (determined by immunofluorescence studies). When approx. 10^8 cells of a 10-day-old subculture were inoc. s.c. into 3 irradiated (400 r) 4-wk.-old hamsters, they produced palpable neoplasms at the inoc. site, morphologically similar to SV40-induced tumors of the retina, choroid and iris (composed of undifferentiated spindle or epithelial type cells) 3 wk. later. Transplantable tumor lines of lens epithelial origin were easily established by inoc. of these tumors into other hamsters.

69-2384 'SPONTANEOUS' OCCURRENCE OF YABA TUMOR IN A MONKEY COLONY. (E.) Ambrus, J. L. (Roswell Park Mem. Inst., Buffalo, N. Y.), H. V. Strandstrom and W. Kawinski. Experientia 25(1):64-65, 1969.

During a period when flies and mosquitoes were occasionally seen in the monkey quarters (Springville, New York), 11 animals without histories of inoc. with Yaba virus (YV) developed tumors histologically identical to those produced by YV. Cell-free filtrates from these tumors, inoc. s.c. into normal monkeys, induced typical tumors. Most of the "spontaneous" tumors developed on hairless areas of the face, palms and interdigital areas. After 1 yr. of strict cleaning (especially spraying with insecticides and disinfection of the rooms) and isolation of the monkey colony, no further "spontaneous" tumors were observed. The possibility of transmission of YV by insect vectors is mentioned.

69-2385 CYTOMEGALOVIRUSES AS COMMON ADVENTITIOUS CONTAMINANTS IN PRIMARY AFRICAN GREEN MONKEY KIDNEY CELL CULTURES. (E.) Smith, K. O. (NIH, Bethesda, Md.), J. F. Thiel, J. T. Newman, E. Harvey, M. D. Trousdale, W. D. Gehle and G. Clark. J. Nat. Cancer Inst. 42(3):489-497, 1969.

Cytomegaloviruses (CMV) were found after prolonged observation periods in 27/52 primary cultures of African green monkey (AGM) kidney cells, derived from apparently healthy animals. All CMV strains tested also produced a CPE in WI-38 human embryonic lung cell cultures. Serological data indicated that these herpes viruses were widely distributed as latent infections among apparently healthy African green monkeys. The significance of these findings is discussed in the light of the association between herpes viruses and malignant processes.

69-2386 SIGNIFICANCE OF A COMPLEMENT-FIXING ANTIGEN ASSOCIATED WITH HERPES-LIKE VIRUS AND DETECTED IN THE RAJI CELL LINE. (E.) Pope, J. H. (Queensland Inst. Med. Res., Brisbane, Australia), M. K. Horne and E. J. Wetters. Nature (London) 222(5189):186-187, 1969.

The presence of this soluble complement-fixing antigen, apparently related to the presence of a herpes-like virus in Raji cells (as well as in the QIMR-WIL leukemic and QIMR-GOR Burkitt lymphoma cell lines), suggested that this antigen is similar to the tumor (T) antigen found in tumors or transformed cell lines induced by other viruses.

69-2387 LEUKEMIA-LIKE PATTERN OF THE DNA, RNA, AND PROTEIN CONTENT OF INDIVIDUAL MONONUCLEAR CELLS IN THE PERIPHERAL BLOOD OF PATIENTS WITH INFECTIOUS MONONUCLEOSIS. (E.) Gahrton, G. (Karolinska Inst., Stockholm) and G. E. Foley. Cancer Res. 29(5):1076-1081, 1969.

Cytochemical analysis of single mononuclear cells from the peripheral blood buffy coats of 8 pts. with infectious mononucleosis revealed that approx. 10% were in the S or G_2 phase of

DNA synthesis. The degree of intercellular variability in total nucleotide content and mass in individual mononuclear cells was greater than that observed among normal lymphocytes, and similar to the variability seen in populations of leukemic blast cells from pts. with acute leukemia. The cells examined seemed to contain 1 non-dividing population which did not accumulate protein and RNA, and 2 populations (1 dividing, 1 non-dividing) which accumulated both protein and RNA. The populations characterized by large total nucleotide and mass values appeared to be identical to those classified as atypical mononuclear cells, which might be genetically distinct from the other mononuclear cells in such populations. The similarities of cytochemical patterns of mononuclear blood cells in infectious mononucleosis and acute leukemia are discussed, with a brief reference to the possible role of the Epstein-Barr virus.

69-2388 USE OF ENZYME-LABELED ANTIBODY FOR ELECTRON MICROSCOPE LOCALIZATION OF LYMPHOCYTIC CHORIOMENINGITIS VIRUS ANTIGENS IN INFECTED CELL CULTURES. (E.) Abelson, H. T. (NCI, Bethesda, Md.), G. H. Smith, H. A. Hoffman and W. P. Rowe. J. Nat. Cancer Inst. 42(3): 497-515, 1969.

When 3T3 mouse cells were infected with lymphocytic choriomeningitis (LCM) virus, intense staining of the extracellular virus particles by horseradish peroxidase-labeled guinea pig anti-LCM antibody conjugates was observed. Virus-specific antigens, in association with large cytoplasmic ribosomal aggregates, were found in infected cells. The value of enzyme-labeled antibody for antigen localization under both the light and the electron microscope is stressed.

69-2389 THE EFFECT OF TREATMENT WITH A COMBINATION OF 6-MERCAPTOPURINE AND PORFIROMYCIN ON AN ESTABLISHED FRIEND LEUKEMIA VIRUS INFECTION. (E.) Sidwell, R. W. (South. Res. Inst., Birmingham, Ala.), G. J. Dixon, P. Compton and F. M. Schabel, Jr. Cancer Res. 29(3):497-502, 1969.

69-2390 DOUBLE TRANSFORMATION OF HAMSTER CELLS BY ROUS VIRUS AND POLYOMA VIRUS. (Fr.) Montagnier, L. (Inst. Radium, Essonne, France), G. Meyer and P. Vigier. C.R. Acad. Sci. [D] 268(24):2986-2989, 1969.

69-2391 NONMALIGNANT AND MALIGNANT CHANGES IN HAMSTERS INOCULATED WITH EXTRACTS OF HUMAN OSTEOSARCOMAS. (E.) Finkel, M. P. (Argonne Natl. Lab., Argonne, Ill.), B. O. Biskis and C. Farrell. Surgery 92(7):1546-1552, 1969.

69-2392 STUDY OF THE MECHANISM OF INDUCTION OF SV40 VIRUS DEVELOPMENT IN TRANSFORMED SYRIAN HAMSTER CELLS. II. KINETICS OF VIRION PRODUCTION. (Fr.) Cassingena, R. (Inst. Sci. Res. Cancer, Villejuif, France), P. Tournier and P. May. Ann. Inst. Pasteur 117(1):115-124, 1969.

69-2393 IMMUNOLOGIC AND VIRUS STUDIES WITH HUMAN SARCOMAS. (E.) Morton, D. L. (NCI, Bethesda, Md.), R. A. Malmgren, W. T. Hall and G. Schidlovsky. Surgery 66(1):152-161, 1969.

69-2394 DIFFERENCES IN THE BIOCHEMICAL ARCHITECTURES OF SURFACE MEMBRANES OF NORMAL AND VIRALLY TRANSFORMED CELLS. (E.) Burger, M. M. (Princeton U., N. J.). Fed Proc. 28(2):568, 1969.

69-2395 AMINOACYLATION OF ONE OF THE TWO RNA COMPONENTS ISOLATED FROM AN ONCOGENIC VIRUS. (E.) Erikson, R. L. (U. Colorado Med. Sch., Denver) and E. Erikson. Fed. Proc. 28(2):846, 1969.

69-2396 HOST RANGE VARIANTS OF MURINE LEUKEMIA VIRUS. (E.) Meier, H. (Jackson Lab., Bar Harbor, Me.), D. D. Myers and R. J. Huebner. Fed. Proc. 28(2):298, 1969.

69-2397 FLUORESCENT ANTIBODY STUDIES OF CHEMICAL AND VIRUS-INDUCED THYMIC LYMPHOMAS IN C57BL MICE. (E.) Doell, R. G. (Stanford U., Calif.). Fed Proc. 28(2):314, 1969.

69-2398 CELLULAR TRANSMISSION OF CANINE LYMPHOMA AND LEUKEMIA IN BEAGLES. (E.) Cohen, H. (U. Kansas Med. Sch., Kansas City), A. L. Chapman, J. Ebert, W. Bopp and C. Gravelle. Fed Proc. 28(2):750, 1969.

69-2399 ROLE OF INTERFERON IN SUPPRESSION BY STATOLON OF ESTABLISHED FRIEND VIRUS INFECTION IN DBA/2 MICE. (E.) Wheelock, E. F. (Case Western Reserve U., Cleveland, Ohio) and N. L. Caroline. Fed Proc. 28(2):503, 1969.

69-2400 SUSCEPTIBILITY TO FRIEND VIRUS LEUKEMIA DURING DEVELOPMENT OF VIRUS-INDUCED THYMIC LYMPHOMA. (E.) Rich, M. A. (A. Einstein Med. Ctr., Philadelphia, Pa.), S. Karl and R. Clymer. Fed Proc. 28(2):314, 1969.

69-2401 INTRACELLULAR DISTRIBUTION OF NUCLEASES AND NUCLEIC ACIDS IN FRIEND LEUKEMIA MOUSE SPLEEN. (E.) Chakrabarty, A.

(A. Einstein Med. Ctr., Philadelphia, Pa.), W. Ceglowski and H. Friedman. Fed. Proc. 28(2): 298, 1969.

69-2402 PERSISTENCE OF GROSS LEUKEMIA VIRUS INFECTION IN VITRO. (E.) Imagawa, D. T. (UCLA Med. Sch., Los Angeles, Calif.) and M. Nakai. Fed. Proc. 28(2):298, 1969.

69-2403 EARLY APPEARANCE OF GROSS LEUKEMIA FOLLOWING INTRATHYMIC INJECTION. (E.) Mariani, T. (Variety Club Heart Hosp., Minneapolis, Minn.). Fed Proc. 28(2):297, 1969.

69-2404 RAUSCHER LEUKEMIA VIRUS-INDUCED IMMUNOSUPPRESSION OF SPLEEN CELLS CULTURED IN MILLIPORE DIFFUSION CHAMBERS. (E.) Borella, L. (St. Jude Child. Res. Hosp., Memphis, Tenn.). Fed. Proc. 28(2):314, 1969.

69-2405 BIOLOGIC DIFFERENTIATION OF 3 LEUKEMIAS OF SIMILAR CELL TYPE. (E.) Nielsen, A. H. (U. Kansas Sch. Med., Kansas City), H. Cohen, O. J. Mira and A. A. Werder. Fed. Proc. 28(2):750, 1969.

69-2406 OUTBREAK OF RETICULUM CELL SARCOMA IN SEGREGATED COLONY OF JAPANESE QUAIL. (E.) Nishimura, E. T. (U. Hawaii Med. Sch., Honolulu), G. Leslie and E. Ross. Fed. Proc. 28(2):750, 1969.

69-2407 THEORETICAL MODELS OF SARCOMAGENESIS. (E.) Siegler, R. (New Eng. Deaconess Hosp., Boston, Mass.). Fed. Proc. 28(2):297, 1969.

69-2408 STUDIES ON RETICULUM CELL SARCOMA IN HAMSTER. (E.) Gerber, M. (Chicago Med. Sch., Ill.), S. R. Rohlfing, E. R. Brown and S. O. Schwartz. Fed. Proc. 28(2):314, 1969.

69-2409 CONTINUOUS VIRAL REPLICATION AND MALIGNANT CELLULAR TRANSFORMATION IN RAT EMBRYO CELLS INFECTED WITH FINKEL'S OSTEOSARCOMA VIRUS. (E.) Rhim, J. S. (Microbiol. Assoc., Inc., Bethesda, Md.), R. J. Huebner, W. T. Lane and H. C. Turner. Fed. Proc. 28(2):313, 1969.

69-2410 VIRUS-INDUCED SARCOMA OF MICE: INHIBITION BY AN RNA INDUCER OF INTERFERON. (E.) Sarma, P. S. (NIH and Microbiol. Assoc., Inc., Bethesda, Md.), G. Shiu, R. Neubauer, S. Baron and R. J. Huebner. Fed. Proc. 28(2):297, 1969.

69-2411 VIRUS KINETICS IN MURINE SARCOMA. (E.) Imahori, S. (New England Deaconess Hosp., Boston, Mass.). Fed. Proc. 28(2):297, 1969.

69-2412 LEUKEMOID REACTIONS IN GERMFREE RATS WITH ROUS SARCOMA VIRUS (RSV)-INDUCED SARCOMAS. (E.) Pollard, M. (U. Notre Dame, Ind.) and M. Kajima. Fed. Proc. 28(2):297, 1969.

69-2413 ATTEMPTS AT UNMASKING THE RSV IN MONKEYS TUMOR. (E.) Kung, T. (New York U. Med. Ctr., N. Y.), M. Lyons, I. Munroe and B. Bates. Fed. Proc. 28(2):298, 1969.

69-2414 MALIGNANCY OF MARMOSET KIDNEY CELLS TRANSFORMED EITHER SPONTANEOUSLY OR BY ROUS SARCOMA VIRUS. (E.) Marczynska, B. (U. Chicago, Ill.), F. Gavitt and F. Deinhardt. Fed. Proc. 28(2):313, 1969.

69-2415 VIRUS-SPECIFIC ANTIGENS IN HAMSTER CELLS TRANSFORMED BY ROUS SARCOMA VIRUS. (E.) Fleissner, E. (Sloan-Kettering Inst., New York, N. Y.). Fed. Proc. 28(2):313, 1969.

69-2416 MURINE EPENDYMOBLASTOMA IN VITRO: GROWTH AND MORPHOLOGIC FEATURES. (E.) Ames, R. P. (Roosevelt Hosp., New York, N. Y.) and R. Rubin. Fed. Proc. 28(2):754, 1969.

69-2417 EFFECTS OF IMMUNIZATION WITH SIMIAN ADENOVIRUS SA-7 ON THE TRANSPLANTABILITY OF SA-7 TUMOR CELLS. (E.) Casto, B. C. (AMA Inst. Biomed. Res., Chicago, Ill.), G. L. Van Hoosier and J. J. Trentin. Fed. Proc. 28(2):298, 1969.

69-2418 INACTIVATION RATES OF THE INFECTIVITY AND TUMORIGENICITY OF THE ONCOGENIC SIMIAN ADENOVIRUS SA-7. (E.) Van Hoosier, G. L. (Baylor U. Coll. Med., Houston, Tex.), B. C. Casto and J. J. Trentin. Fed. Proc. 28(2):313, 1969.

69-2419 SYNTHESIS AND MORPHOGENESIS OF ADENOVIRUS CAPSID PROTEINS. (E.) Velicer, L. F. (U. Pennsylvania Sch. Med., Philadelphia) and H. S. Ginsberg. Fed. Proc. 28(2):906, 1969.

69-2420 CELL-MEDIATED COMPLEMENTATION OF DNA VIRUSES. (E.) Jerkofsky, M. A. (Baylor U. Coll. Med., Houston, Tex.) and F. Rapp. Fed. Proc. 28(2):698, 1969.

69-2421 INHIBITION OF ADENOVIRUS-12 ONCOGENESIS IN MALE AND FEMALE HAMSTERS. (E.) Li, C. P. (NIH, Bethesda, Md.), B. Prescott and E. C. Martino. *Fed. Proc.* 28(2):313, 1969.

69-2422 DEGRADATION AND INTEGRATION OF ADENOVIRUS TYPE 12 DNA IN ABORTIVE INFECTION OF HAMSTER CELLS. (E.) Zur Hausen, H. (Child. Hosp., Philadelphia, Pa.) and F. Sokol. *Fed. Proc.* 28(2):914, 1969.

69-2423 AN ENDONUCLEASE ASSOCIATED WITH ADENOVIRUS TYPES 2 AND 12. (E.) Burlingham, B. T. (Rockefeller U., New York, N. Y.) and W. Doerfler. *Fed. Proc.* 28(2): 434, 1969.

69-2424 MECHANISM OF ENHANCEMENT OF ADENOVIRUS TYPE 2 BY SV40 VIRUS. (E.) Friedman, M. P. (U. Pennsylvania Sch. Med., Philadelphia), M. J. Lyons and H. S. Ginsberg. *Fed. Proc.* 28(2):698, 1969.

69-2425 SPONTANEOUS REGRESSION OF SHOPE PAPILLOMA VIRUS-INDUCED PAPILLOMAS OF FETAL RAT SKIN TRANSPLANTED TO THE ADULT RAT. (E.) Kreider, J. W. (Pennsylvania State U., Hershey) and C. Breedis. *Fed. Proc.* 28(2): 686, 1969.

69-2426 ANTIGEN AND BIOCHEMICAL CHANGES IN MEMBRANES OF VIRUS-TRANSFORMED CELLS. (E.) Black, P. H. (Mass. Gen. Hosp., Boston), H. Wu, E. Meezan, H. T. Robertson and P. W. Robbins. *Fed. Proc.* 28(2):567, 1969.

69-2427 MORPHOLOGIC AND FUNCTIONAL EFFECTS OF POLYOMA VIRUS ON MOUSE LYMPHATIC TISSUES. (E.) Proffitt, M. R. (U. Tennessee, Knoxville) and C. C. Congdon. *Fed. Proc.* 28(2):313, 1969.

69-2428 DEVELOPMENTAL RESISTANCE TO POLYOMA VIRUS ONCOGENESIS AND RUNTING IN MICE TREATED WITH ALS. (E.) Al-Falluji, M. M. (Ohio State U., Columbus), J. P. Minton and M. C. Dodd. *Fed. Proc.* 28(2):768, 1969.

69-2429 SURFACE ANTIGENS IN CELLS TRANSFORMED BY PAPOVAVIRUS SV40. (E.) Tevethia, S. S. (Baylor U. Coll. Med., Houston, Tex.), R. N. Lausch S. Layne and F. Rapp. *Fed. Proc.* 28(2):567, 1969.

69-2430 SURFACE CHANGES IN SV40-TRANSFORMED AND TUMOR CELLS. (E.) Defendi, V. (Wistar Inst. Anat. Biol., Philadelphia, Pa.) and P. Hayry. *Fed. Proc.* 28(2):567, 1969.

69-2431 TWO DISTICT TYPES OF SV40 TRANSFORMED HUMAN AMNION CELLS. (E.) Gaffney, E. V. (Sloan-Kettering Inst., Rye, N. Y.), L. Ramos and J. Fogh. *Fed. Proc.* 28(2):314, 1969.

69-2432 CORRELATION BETWEEN "CRISIS" AND VIRUS PRODUCTION IN SV40 TRANSFORMED HUMAN AMNION CULTURES. (E.) Fogh, J. (Sloan-Kettering Inst., Rye, N. Y.), J. D. Loveless and E. V. Gaffney. *Fed. Proc.* 28(2):297, 1969.

69-2433 ALTERATIONS IN BIOLOGIC CHARACTERISTICS OF VIRUS INDUCED HAMSTER TUMOR CELLS BY NUCLEIC ACID. (E.) Goldner, H. (A. Einstein Med. Ctr., Philadelphia, Pa.) and D. R. Meranze. *Fed. Proc.* 28(2):314, 1969.

69-2434 APPEARANCE OF FORSSMAN ANTIGEN ON THE CELL SURFACE FOLLOWING TRANSFORMATION BY VIRUSES. (E.) O'Neill, C. H. (Mass. Gen. Hosp., Boston). *Fed. Proc.* 28(2):568, 1969.

69-2435 ATTEMPTED RESCUE OF EB VIRUS BY SUPERINFECTION WITH HERPES SIMPLEX VIRUS. (E.) Floyd, R. (Baylor U. Coll. Med., Houston, Tex.), V. Vonka, D. D. Porter and M. Benyesh-Melnick. *Fed. Proc.* 28(2):698, 1969.

69-2436 HERPES-LIKE VIRUS ISOLATED FROM LEUKEMIA SUSCEPTIBLE GUINEA PIGS. (E.) Hsiung, G. D. (Yale U. Sch. Med., New Haven, Conn.) and L. S. Kaplow. *Fed. Proc.* 28(2):697, 1969.

69-2437 ALTERED tRNA METHYLASE ACTIVITIES IN A GA VIRAL INDUCED CHICK LIVER TUMOR. (E.) Hacker, B. (Merck Inst. Ther. Res., Rahway, N. J.), L. R. Mandel and T. Maag. *Fed. Proc.* 28(2):350, 1969.

See also abstract nos.: 2210,2211,2212,2213,2214,2220,2221,2229,2305,2309,2322,2492

69-2438 MORTALITY FROM NEOPLASMS OF BRAIN AND OTHER PARTS OF NERVOUS SYSTEM (193,223,237). (E. and Fr.) no author. World Health Stats. Rep. 22(3):193-232, 1969.

Data on deaths from benign tumors (#223), malignant tumors (#193) and neoplasms of unspecified type (#237) of the brain and nervous system, from 1951-1965 (inclusive), are presented in 7 sets of tables. The data were obtained from 19 nations throughout the world. The 1951-1955 data are tabulated as av. values; the 1956-1965 data are tabulated separately for each yr. in 4 sets of tables, and for the 5-yr. periods 1956-1960 and 1961-1965 in the other tables. The total numbers of deaths, crude and age-adjusted mortality rates/100,000 population, and rates as percentages of all cancer deaths, are tabulated for the total populations and for males and females separately.

69-2439 CLEVELAND CLINIC FIRE SURVIVORSHIP STUDY, 1929-1965. (E.) Gregory, K. L. (Meidinger and Assoc., Inc., Louisville, Ky.), V. F. Malinoski and C. R. Sharp. Arch. Environ. Health (Chicago) 18(4):508-515, 1969.

On May 15, 1929, an estimated 12,500 pounds of nitrocellulose X-ray films ignited and exploded inside the Cleveland Clinic building, releasing poisonous gases (CO, HCN and NO) which caused 97 deaths within 2 hr. Cumulative observed survival rates from 1929 through 1965 were tabulated for 489 persons who had been exposed to these gases (firemen, policemen, employees of the Cleveland Clinic and rescue workers) and for 1420 persons of the same occupational groups (excluding rescue workers) who were not at the scene of the disaster. Data on the pts. and visitors in the hospital at that time are not included. The exposed persons had about the same mortality experience as the non-exposed controls. The frequencies of various fatal diseases, including cancer of the lung and bronchus and other malignant tumors, were about the same in the exposed and non-exposed persons.

69-2440 GASTRIC CANCER IN MAN AND PHYSICAL ACTIVITY AT WORK. (E.) Stukonis, M. (Univ. Coll. Hosp. Sch. Med., London) and R. Doll. Int. J. Cancer 4(2):248-254, 1969.

Standardized mortality ratios (SMR) for stomach cancer were tabulated according to social class and the degree of physical activity required in the occupations studied, using data for 14,353 men (age 20-64 yr.) who died from stomach cancer in England and Wales in 1949-1953 (inclusive). Mean SMR values (excluding the standard deviations) in social classes I, II, III, IV and V (all occupations combined) were 52, 74, 100, 120 and 144, resp. Mean SMR values in occupations requiring light, intermediate and heavy physical activity (all classes combined) were 82, 105 and 148, resp. The SMR for the entire group (all classes and occupations combined) was 104 ± 0.9; it differed from 100 because 87/425 registered occupations were excluded, since they combined occupations in 2 social classes. The relationship betweem the SMR for stomach cancer and the degree of physical activity was most evident in social class III, which comprised nearly 50% of the cases (6774/14,353). SMR values for lung cancer, all other cancers (combined), gastric ulcer and several other g.i. diseases showed only minor variations according to social class or physical activity. It is suggested that men doing heavy work may be exposed to higher levels of dietary carcinogens (because of their consumption of greater amounts of food) than men doing light work. It is also suggested that cheaper foods (especially if they are imperfectly preserved) may contain larger amounts of carcinogens than the more expensive foods.

69-2441 MUCOSAL MELANOMAS OF THE HEAD AND NECK. (E.) Hormia, M. (N. Karelia Cent. Hosp., Joensuu, Finland) and E. E. J. Vuori. J. Laryng. 83(4):349-359, 1969.

From 1953-1964 (inclusive), the Finnish Cancer Register recorded 116,263 malignant tumors, including 10 mucosal melanomas of the head and neck (ratio, 1/11,626). The authors' earlier records disclosed 1 additional case. The 1953-1963 records disclosed 7253 mucosal tumors of the upper respiratory and g.i. tracts; the ratio of melanomas to all mucosal tumors of the head and neck was 1/806. The records for 1953-1964 disclosed 1047 melanomas of the skin; the ratio of mucosal melanomas of the head and neck to all melanomas was 1/105. One mucosal melanoma arose in the tongue and another in the larynx and pharynx; the other 9 tumors arose in the nasal cavity (5) or the soft or hard palate (4).

69-2442 CHILDREN IN HOSPITAL IN SIERRA LEONE: A SURVEY OF 10,000 ADMISSIONS. (E.) Wilkinson, J. L. (Nixon Mem. Meth. Hosp., Segbwema, Sierra Leone). Trans. Roy. Soc. Trop. Med. Hyg. 63(2):263-269, 1969.

In 1955-1964, 10,159 children were admitted to this hospital. Of these pts., 48% were 0-1 yr. old; 11% died in the hospital, and 8% were taken away by their parents (most of these pts. were believed to have died). Malignant tumors were noted in 65/10,159; 51/65 had Burkitt's lymphoma.

69-2443 BREAST CANCER AND THE MENOPAUSE. (Ger.) Berndt, H. (Inst. Cancer Res., German Acad. Sci., Berlin) and K. Lattermann. Arch. Geschwulstforsch. 33(1):55-65, 1969.

A retrospective study of 1039 women with breast cancer, treated at the Robert Rössle Clinic between 1949-1964 (inclusive) is presented. The incidence of mastopathies, ovarian and other gynecologic disorders, and thyroid disorders (chiefly hyperthyroidism and euthyroid goiter) was higher among pts. first treated for breast cancer before the menopause, than in the pts. first treated after the menopause. The pts. first treated for cancer after the menopause tended to show obesity, hypertension, decreased glucose tolerance, gallbladder disorders and a familial history of breast cancer. The symptoms seen in the premenopausal pts. suggested a generalized disturbance of endocrine function, while the associated symptoms in the postmenopausal pts. suggested a more or less specific disturbance of adrenal function. However, the differences observed appeared to be largely attributable to the aging process as such.

69-2444 CERVICAL CARCINOMA IN THE AGED. (E.) Siegler, E. E. (Marymount Hosp., Cleveland, Ohio). Amer. J. Obstet. Gynec. 103(8):1093-1097, 1969.

A survey of 483,000 cervical smears, obtained from women in the Cleveland area, disclosed 705 carcinomas in situ and 603 invasive carcinomas of the cervix. The 30,000 aged women (65 and over) examined, comprising about 6% of the study group (compared to 15% of the total female population), showed about 5% of the carcinomas in situ (33/705) and over 20% of the invasive carcinomas (127/603). The cervix cancer detection rate in the aged women was 5.3/1000 (1.1 and 4.2/1000 for in situ and invasive carcinoma, resp.), compared to only 2.6/1000 (1.5 and 1.1/1000, resp.) in the women under 65. Estrogens were apparently not needed for the morphogenesis of carcinoma in situ, since 31/33 such lesions from aged women showed little or no estrogenic activity. Only 1/33 of these lesions was known to have developed after age 65. Most of the carcinomas in situ from the aged women (25/33) were at least questionably invasive. These results contradict the common assumption that cancer of the cervix is rare in aged women.

69-2445 PERIODIC MAMMOGRAPHY SURVEY FOR OCCULT CARCINOMA DETECTION. (E.) Stevens, G. M. (Palo Alto Med. Clin., California). Oncology 23(2):172-173, 1969.

Mammography was performed in 1223 asymptomatic, clinically negative women (age 40 yr. and over), who were asked to return annually for 5 yr. The participation rate fell from 80% in the second yr. to 62% in the fifth; only 46% of the group underwent all 5 annual examinations. Over this 5-yr. period, 12 cancers were detected and histologically verified by mammography; 10 other mammography pictures were later identified as false negatives. Occult carcinomas were noted in 0.65% in the first yr.; the detection rate in the subsequent examinations was 0.11%. Only 54% of all cancers developing during this 5-yr. interval were first identified by mammography. However, in women with specific symptoms or clinically suspicious findings, the results of mammography were 85% accurate. In a summary of several reports of survey mammography in the U.S., the composite yield of occult carcinoma in the first yr. (43,875 women) was 0.16%, compared to 0.06% in the second yr. (13,361 women). It is concluded that mammography will probably have little effect on the breast cancer mortality rates, because of its inherent inaccuracy and the reluctance of asymptomatic women to undergo periodic prophylactic health examinations; however, it will be valuable to pts. in high-risk groups, and women who have the motivation and opportunity to undergo this procedure.

69-2446 SCREENING FOR BREAST CARCINOMA. (E.) Griesbach, W. A. (Kaiser Found. Hosp., San Francisco, Calif.). Oncology 23(2):167-171, 1969.

From September, 1964-August, 1967, 2 groups of women underwent mammography and physical examination for breast cancer in a San Francisco medical center. Breast cancer was found in 52/25,209 women (147/100,000). Mammography detected 31/52 of these tumors (12/31 were not palpable); the other 21 tumors were detectable only by physical examination. In 1 group of women over 40, breast cancer was found in 16/12,245 (0.15%). The mammographic detection rate was 0.09% in this group (11/16 tumors). Breast cancer was noted in 5/5031 women under 50 (0.10%) and 13/7214 (0.18%) women over 50; the 11 tumors detected by mammography were all found in the over-50 age group. In the other group, the age limit was raised to 47 yr. Breast cancer was noted in 36/12,964 (0.28%) and the mammographic detection rate was 0.15% (20/36 tumors).

69-2447 CARCINOMA OF THE MALE BREAST. (E.) Norris, H. J. (Armed Forces Inst. Path., Washington, D. C.) and H. B. Taylor. Cancer 23(6):1428-1435, 1969.

The Armed Forces Institute of Pathology collection yielded 4810 cases of breast carcinoma; 113 specimens (2.4%) were obtained from males. Of the 108 evaluable male pts., 80% were white, 19% were Negro and 1% were Japanese. No bilateral tumors and no cases of Paget's disease were found. Bilateral gynecomastia was present in 5% of the group. Because of the high frequency of centrally located tumors (78%), the prognosis of breast cancer was worse in males than in females.

69-2448 A BRIEF REPORT ON PUBLIC HEALTH ADMINISTRATION IN JAPAN (1968). (1).

(E.) no author. Asian Med. J. 12(3):187-209, 1969.

Vital statistics records for Japan since 1900 are presented. The data for 1900-1940 are usually presented for each yr. at 10- or 5-yr. intervals; after 1940 (except for a hiatus from 1944-1946 inclusive), annual data are given. Annual death rates/100,000 population from malignant tumors (all tumors combined) increased gradually during this period, from 46.4 in 1900 to 74.5 in 1967. In 1950, malignant tumors caused 7.1% of all deaths, compared to 16.7% in 1967.

69-2449 DEVELOPMENT OF STOMACH CANCER IN THE HUMAN BODY. (Jap.) Kori, Y. (Metropolitan U. Kyoto Sch. Med., Japan), S. Yamashita, K. Shimamoto, T. Ashikara, O. Takeoka, S. Fujita, K. Kawai, H. Kadotari and M. Shinoda. Saishin Igaku 24(2):471-481, 1969.

The growth rate of human stomach cancers was studied in vivo by ^{3}H-thymidine autoradiography. Growing normal gastric cells were found between the surface epithelium and the glandular epithelium of the stomach; 40% of these cells were labeled (using the "flash labeling" method), compared to 20-25% of the cancer cells. In the cancer cells, the DNA synthesis times (24-32 hr.) and the cell generation times (12-12.3 days) were 2-3 times longer than in the normal cells. The early and late stages of stomach cancer showed almost the same cell growth rates.

69-2450 GLUTAMINASE ACTIVITIES AND GROWTH RATES OF RAT HEPATOMAS. (E.) Linder-Horowitz, M. (Harvard U. Sch. Med.) W. E. Knox, and H. P. Morris. Cancer Res. 29(6):1195-1199, 1969.

In 6 transplantable rat hepatomas, the vol. doubling time ranged from 3.0 days (Morris 7793) to 29.2 days (Dunning LC18). All except the slowest-growing of the tumors contained phosphatase-dependent glutaminase of the kidney type. A significant direct correlation was seen between the growth rate and the enzyme activity in tumors with the kidney-type glutaminase.

69-2451 ANALYSES OF DNA CONTENT, NUCLEAR SIZE AND CELL PROLIFERATION OF TRANSITIONAL CELL CARCINOMA IN MAN. (E.) Levi, P. E. (U. Leeds, England), E. H. Cooper, C. K. Anderson, and R. E. Williams. Cancer 23(5):1074-1085, 1969.

Tumor cell ploidy and growth rates were studied (using ^{3}H-thymidine incorporation into DNA) in 31 tumors of the bladder and 5 of the ureter. The epithelial cells of the normal ureter were diploid; 4/5 tumors of the ureter were either diploid or (in 1 case) hyperdiploid, and the other tumor (anaplastic, highly invasive) showed a hypo-octoploid level of DNA. The normal bladder epithelium was polyploid. Bladder tumors were diploid at first, but progressed to hypotetraploid and eventually (especially among the solid tumors) grossly aneuploid populations. No simple correlation between tumor histology and the labeling index was found. In well-differentiated tumors, nuclear size was too variable to serve as an index of ploidy. In most tumors, the cell proliferation rate was low.

69-2452 RELATIONSHIP OF NORMAL CDF$_1$ MOUSE LEUKOCYTE KINETICS TO GROWTH CHARACTERISTICS OF LEUKEMIA L1210. (E.) DeVita, V. T. (NCI, Bethesda, Md.), C. Denham and S. Perry. Cancer Res. 29(5):1067-1071, 1969.

In normal female CDF$_1$ mice, the results of liquid scintillation and radioautographic studies of WBC kinetics suggested that either bone marrow storage and transit times are different from those observed in man, or (more likely) that the generation times of the bone marrow progenitor cells are shorter in mice than in man. A proportion of the bone marrow cells consisted of viable but non-proliferating cells (G_0 stage); by comparison, the L1210 mouse leukemia contains no non-proliferating pool of cells. Other differences in the kinetics of normal mouse WBC and this leukemia are discussed, on the basis of previously published data.

69-2453 CELLULAR KINETICS OF INVASIVE SQUAMOUS CARCINOMA OF THE HUMAN CERVIX. (E.) Bennington, J. L. (U. Washington Sch. Med., Seattle). Cancer Res. 29(5):1082-1088, 1969.

Cell kinetics in vivo were studied in tumors of 2 pts. inj. with ^{3}H-thymidine. The majority of the dividing cells were seen at the periphery of the tumor nodules, which apparently grew by expansion from within and inward migration of newly formed cells. From 17-21% of the interior cells were capable of dividing; the growth fraction at the periphery of the tumor nodules was 41-53%. Cell cycle times and DNA synthesis times resembled those of normal mammalian cells. Some cells in the interior of the tumor nodules seemed to be arrested in mitosis.

69-2454 CURRENT MORTALITY REPORT. STANDARD ORDINARY POLICYHOLDERS, METROPOLITAN LIFE INSURANCE COMPANY 1967 AND 1963-67. (E.) (no author). Statist. Bull. Metrop. Life Insur. Co. 50:10-12, 1969.

69-2455 CANCER SURVIVAL AMONG MEN BY AGE. CANCER DIAGNOSED AMONG WHITE MALES, 1950-64. (E.) (no author). Statist. Bull. Metrop. Life Insur. Co. 50:2-4, 1959.

See also abstract nos.: 2208,2215,2216,2217,2218,2223,2231,2245,2246,2384,2456,2472

MISCELLANEOUS

69-2456 DYSPLASIA AND CARCINOMA OF THE UTERINE CERVIX. IV. A CORRELATED CYTOLOGIC AND HISTOLOGIC STUDY WITH SPECIAL EMPHASIS ON VAGINAL MICROBIOLOGY. (E.) Meisels, A. (Laval U. Fac. Med., Quebec, Canada). Acta Cytol. (Balt.) 13(4):224-231, 1969.

From January, 1961-July, 1967, over 118,000 cervical smears from about 75,000 women were examined, yielding cytological evidence of dysplasia or carcinoma of the cervix in 1247 pts. The diagnosis was confirmed histologically in 406 pts. In the pts. with confirmed dysplasia or carcinoma, the mean age in the group of pts. with preinvasive cancer was 10 yr. less than the mean age in the pts. with invasive cancer. Trichomonas vaginalis infections were found in 34.7% of the pts. with confirmed dysplasia or carcinoma of the cervix, compared to 10.5% in a cytologically negative control group; Candida albicans infections were found in 5.4% and 6.0%, resp. It is suggested that T. vaginalis may be the agent (or the vector for the agent) that can initiate the process of cervical dysplasia, which becomes irreversible at some stage.

69-2457 DNA CONTENT IN EPITHELIAL CELLS OF DYSPLASIAS OF THE UTERINE CERVIX. HISTOLOGIC AND MICROSPECTROPHOTOMETRIC OBSERVATIONS. (E.) Silviano Brandão, H. J. (Fac. Med. Ribeirao Preto, São Paulo, Brasil). Acta Cytol. (Balt.) 13(4):232-237, 1969.

Feulgen staining and microspectrophotometric examination of 6 specimens of atypical epithelial dysplasia of the cervix showed an abnormal DNA content in 3/6 specimens, indicating chromosomal modes around the tetraploid level. One of the other 3 specimens showed a normal cell proliferation; the other 2 showed intense proliferation, with at least 3 nuclear classes (1/2 showed a poorly defined secondary mode at the hypotetraploid level). The results supported the assumption that some epithelial dysplasias are a true progressive, transitional form between a benign and a malignant lesion, or an already formed malignant stage.

69-2458 SIZE VARIATION OF THE LATE REPLICATING X-CHROMOSOME IN THE LEUKOCYTES OF INDIVIDUALS WITH HYPERPLASTIC AND MALIGNANT LESIONS OF UTERINE EPITHELIUM. (E.) Bamford, S. B. (Tufts U. Sch. Med., Boston, Mass.) G. W. Mitchell, Jr., J. David, A. Sperber and C. Cassin. Acta Cytol. (Balt.) 13(4):238-245, 1969.

Size variations in the late-replicating X chromosome (studied by ^{3}H-thymidine labeling) in WBC from normal women (7) or pts. with polycystic ovarian disease and endometrial proliferation (6), differed significantly from the variations in the size of this chromosome seen in WBC from 16 pts. with untreated cervical or endometrial cancer (11) or adenomatous hyperplasia of the endometrium (5 pts.), with or without polycystic ovaries. Late-replicating X chromosomes from the WBC of 2 pts. with previously treated endometrial cancer showed size variations of intermediate range. Malignant and premalignant diseases were associated with a high frequency of late-replicating X chromosomes of large size (in the lower ranks of the C series). This size variation may be inherited, with random selection for late replication early in embryogenesis (giving rise to mosaicism), but the results of this study suggested that the observed variation was attributable less to this process than to a later environmental influence, possibly the action of a virus.

69-2459 CHROMOSOMAL ANALYSIS OF A HUMAN MALIGNANT TUMOR IN ORGANOTYPIC CULTURE. (Fr.) De Grouchy, J. (Nat. Ctr. Sci. Res., Paris) and E. Wolff. Europ. J. Cancer 5(2): 159-163, 1969.

A liver metastasis from a woman with stomach cancer was maintained in organotypic culture for several yr. After 4 and 6 yr. of in vitro cultivation, the modal numbers of chromosomes were 64 and 69, resp.; the increase in the modal number resulted from an increase in the frequencies of 3/7 marker chromosomes. Numerical and structural aneuploidy was remarkably constant within and between the 2 series. Throughout the study, 2 cytogenetic features remained apparently unchanged: 7 marker chromosomes (1 of which was dicentric), and a marked reduction in the Group D chromosomes (no more than 4 chromosomes of this group were ever present). Extra chromosomes were noted in all groups except D. The karyotype tended toward an equal distribution in the direction of triploidy, but none of the cultures showed true triploidy. This uniformity of chromosomal variation (within and between the 2 series) supported the chromosomal theory of carcinogenesis.

69-2460 CLINICAL IMMUNOLOGIC STUDIES OF NATURAL RESISTANCES AGAINST NEOPLASIA. (E.) DeCarvalho, S. (Doctors Hosp., Cleveland, Ohio). Z. Immunitaetsforsch. 137(4):278-292, 1969.

A horse antiserum against pooled leukemic human spleen induced the formation of precipitating and cytotoxic antibodies similar to those found in 92% of 180 sera from normal persons (who had never received blood transfusions), and in sera from pts. with acute leukemia in complete remission. No antibodies were found in sera from the same 5 leukemic pts. during the active stages of the disease, or in the sera of 2 pts. showing partial remissions. Specific leukemic or breast cancer antigens (free of horse γ-globulin and filtered to remove any tumor viruses) elicited delayed cutaneous hypersensitivity reactions in 140 subjects without cancer. Similar tests in 11 pts. with leukemia or lymphosarcoma (5/11 were studied during remission) gave variable results. The leukemic antigen caused hypersensitivity reactions only in the pts. in remission, but the cutaneous reactions to breast cancer antigen (positive in 5/5 pts. tested) or normal tissue antigen (positive in 5/11) were seen in some pts. with active disease and some pts. in remission. Cutaneous reactivity to pooled and single (breast cancer) tumor antigens, in 44 pts. with various tumors, depended on the stage of the disease; pts. with advanced disease showed little or no reactivity, suggesting a state of specific anergy (possibly tolerance). Specific congregation of WBC in response to the tumor antigens was noted only in WBC from cancer-free persons showing marked cutaneous hypersensitivity, suggesting that the natural antitumor reactivity was caused by a cell-fixed antibody.

69-2461 NEGATIVE ASSOCIATION BETWEEN ALLERGY AND CANCER. (E.) Ure, D. M. J. (U. Aberdeen, Scotland). Scot. Med. J. 14(2): 51-54, 1969.

A survey of pts. in the gynecology ward of 1 hospital disclosed histories of hay fever-type allergies (excluding drug hypersensitivity) in 28/140 (20%) and cancer in 40/140 (28%). These 2 groups, of comparable ages (av. 50 and 53 yr., resp.) were mutually exclusive. The only pts. with cancer in the allergic group were 2/4 of the pts. whose allergies were described as dubious or mild. The group with neither allergy nor cancer (52% of the group) was younger than the other 2 groups (av. age 46 yr.); it is suggested that this group might include pts. who would develop cancer when older. Histories of pregnancy sickness were reported by nearly all of the allergic pts. In the group of 20 pts. who had never been pregnant, cancer was found in 0/3 with allergies and 10/17 without allergies. In the group of 120 pts. who had been pregnant, cancer was found in 12/31 (39%) reporting no pregnancy sickness. In pts. reporting mild, moderate or severe pregnancy sickness (37, 36 and 14 pts., resp.), cancer was found in 30%, 16% and 0%, resp. The 14 pts. with severe pregnancy sickness also had allergies. The negative correlation between allergy (and/or pregnancy sickness) and cancer was statistically highly significant. It is suggested that a common factor is involved in the host response to foreign proteins (allergens), fetal cells and cancer cells.

69-2462 ANTIBODY PRODUCTION IN CULTURED LYMPHOBLASTOID CELL LINE. (E.) Kamei, H. (Roswell Park Mem. Inst., Buffalo, N. Y.) and G. E. Moore. Experientia 25(4): 410-411, 1969.

The P3-J line of human lymphoblastoid cells (from a pt. with Burkitt's lymphoma), after in vitro exposure to Escherichia coli lysate or RPMI #41 cells (human osteosarcoma), produced growth-inhibiting antibodies in either a primary or a secondary response. The relationship between the antibody production and the characteristic changes in ribosomal morphology seen in P3-J cells exposed to these antigenic stimuli (or to coliphage T2 or phytohemagglutinin) is unknown.

69-2463 DELAYED-TYPE HYPERSENSITIVITY IN MICE AFTER SKIN AND TUMOUR ALLOGRAFTS AND TUMOUR ISOGRAFTS. (E.) Hoy, W. E. (U. Sydney, Australia) and D. S. Nelson. Nature (London) 222(5197):1001-1003, 1969.

The development of delayed hypersensitivity (footpad reactions) in response to lymphocytes from A/J mice was studied in inbred C57BL/6J, Balb/C, CBA or DBA/1 mice, following transplantation of skin grafts, a strain-specific tumor (Sarcoma I), or a non-strain-specific tumor (3-methylcholanthrene-induced sarcoma) from A/J mice. The results confirmed the association between delayed-type hypersensitivity and other manifestations of cell-mediated immunity, and were consistent with the hypothesis that they share common mechanisms. They also confirmed and extended reports of delayed reactions elicited or detected in other ways in allografted mice and mice made resistant to a strain-specific tumor, and of weak, delayed footpad reactions in mice made resistant to non-strain specific tumors.

69-2464 NEOPLASIA AND THE COELIAC SYNDROME. (E.) Fisher, C. M. (Massachusetts Gen. Hosp., Boston). Lancet 1(7597):730, 1969.

A 56-yr.-old man with steatorrhea of 5 yr. duration (well controlled with a gluten-free diet) died from an apparently primary reticulum cell sarcoma of the brain. It is suggested that a viable or non-viable carcinogen reached the CNS from the intestine.

69-2465 MORE ABOUT AN ACQUIRED GROUP B ANTIGEN. (E.) Marantz, C. (Naval Hosp., San Diego, Calif.) and R. M. Dimmette. Transfusion 9(3):160-161, 1969.

A 69-yr.-old diabetic man, who had been classified in blood group A 25 yr. previously, was admitted to hospital with intestinal obstruction. Preoperative examination showed blood of type A_2B (with strong anti-B activity in the serum). The acquisition of the B antigen suggested the presence of an occult tumor; this suspicion was confirmed at operation, which showed a carcinoma of the colon and liver metastases. It is suggested that this rare change in blood group (possibly related to the cancer and/or bacteria) might serve as a screening test for the early detection of some forms of cancer.

69-2466 NEVOID BASAL CELL CARCINOMA SYNDROME. (E.) Walike, J. W. (U. Washington, Seattle) and R. P. Karas. Laryngoscope 79(3): 478-487, 1969.

A 19-yr.-old man with the nevoid basal cell carcinoma syndrome (skin tumors, odontogenic cysts, multiple ossification defects) is described. One of the jaw cysts was identified as a benign calcifying odontogenic myxoma (the first reported case of this tumor in the nevoid basal cell carcinoma syndrome). The family history was negative.

69-2467 CARCINOMA OF THE TONGUE IN A CHILD: REPORT OF CASE. (E.) Lancaster, L., Jr. (Ochsner Clinic, New Orleans, La.) and L. F. Fournet. J. Oral Surg. 27(4):269-270, 1969.

A rare case of a malignant tumor of the oral cavity in a young child is presented: a 6-yr.-old boy with a congenital skin defect (chronic ichthyosis) and squamous cell carcinoma of the tongue. The possibility of a relationship between this tumor and the severe, generalized hyperkeratosis of the skin is mentioned.

69-2468 FAMILIAL NEUROBLASTOMA WITH REGRESSION AND MATURATION TO GANGLIONEUROFIBROMA. (E.) Griffin, M. E. (Children's Hosp., Akron, Ohio) and R. P. Bolande. Pediatrics 43(3): 377-382, 1969.

Two female siblings with regressing and maturing neuroblastoma are described. In 1/2 (who died of the complications of radiotherapy at age 15 mo.), multiple skin tumors were seen at age 8 mo.; in the other child (untreated; living and well at age 14 yr.) the tumors were noted at birth. The surviving child with the regressed tumor showed elevated urinary vanillylmandelic acid (VMA) and dopamine levels (epinephrine and norepinephrine levels were normal), indicating persistent viable tumor tissue. Urinary VMA levels in the other members of the family (the parents and 5 siblings) were slightly elevated. One sister showed a small focus of adrenal calcification. The family history was negative for tumors, neurofibromatosis, skin nodules, cafe-au-lait spots, congenital megacolon and other congenital anomalies.

69-2469 CARCINOMA DEVELOPING IN LUPUS ERYTHEMATOSUS SCAR. (E.) Goldner, R. (U. Maryland Sch. Med., Baltimore). Southern Med. J. 62(6):733,738, 1969.

A man with a squamous cell carcinoma developing in an atrophic facial scar of discoid lupus erythematosus (DLE) is described. Facial DLE had developed 18 yr. previously. Treatment of the DLE had been sporacic (the pt. was lost to follow-up twice), and the pt. had not followed advice to avoid exposure to the sun. Systemic lupus erythematosus was not present.

69-2470 COLLAGEN DISEASE AND CANCER. (E.) Barden, R. P. (Chestnut Hill Hosp., Philadelphia, Pa.). Radiology 92(5):972-974, 1969.

Three adult pts. are briefly reported: a man with dermatomyositis, developing 2 yr. before the diagnosis of an anaplastic carcinoma in the lung hilus; a woman with systemic lupus erythematosus, developing 11 yr. before the diagnosis of acute lymphocytic leukemia; and a woman with scleroderma, developing 8 yr. before death from carcinoma of the left lung. It is suggested that disturbances in immunoglobulin chemistry may be a common factor of collagen disease and cancer, but that they are rarely seen together because either disease alone may be rapidly fatal.

69-2471 CASE OF ACUTE PARANEOPLASTIC DERMATOMYOSITIS WITH SERIOUS DEGLUTITION DISORDERS. CLINICAL AND ANATOMICAL STUDY. (Fr.) Hanania, G. (City Hosp., 1 Parvis Notre Dame Sq., Paris 4, France) R. Assan, M. Bensasson, R. Khalifat, L. Boccond-Gibod and M. Dérot. Ann. Med. Intern. 120(4):275-282, 1969.

A poorly differentiated epidermoid carcinoma of the cervix (with local extension but no metastases) was found at autopsy in a woman who had died of the dysphagic complications of dermatomyositis. In view of the high reported frequency of dermatomyositis as a paraneoplastic syndrome (cancer is found in about 22% of all cases, and the onset of dermatomyositis precedes the diagnosis of cancer in about 60% of these cases), careful examination of all pts. with dermatomyositis for the presence of cancer is recommended.

69-2472 BEHAVIOR OF ALKALI-RESISTANT HEMOGLOBIN AND HEMOGLOBIN A_2 IN SYSTEMIC HISTIOCYTIC SARCOMATOSIS. (It.) Chiarioni, T. (U. Rome, Italy), E. Nardi and G. F. Sasso. Med. Clin. Sper. 18(5):441-467, 1968.

Peripheral blood levels of fetal Hb (alkali-resistant), Hb type A_2 and the slow electrophoretic component of hemolysates (the X fraction) were abnormally high in 7.21%, 0.90% and 2.70%, resp., of 111 pts. with acute or chronic leukemia (92/111), myeloma (8/111) or cryptogenetic bone marrow aplasia (11/111). Some other pts. in this group showed slightly increased values for these fractions. Most of the 94 control subjects tested showed relatively low values for these fractions. A bimodal frequency distribution pattern was found, suggesting that both the pt. and the control groups consisted of 2 statistical populations. Since a majority of the pts. with leukemia and related diseases were found in the higher-mode group, it is suggested that a tendency toward somewhat elevated levels of fetal Hb and (particularly) Hb A_2, might express a basic condition of the hematopoietic system which might facilitate the onset and development of leukemia and related diseases.

69-2473 BLOOD LYMPHOCYTES STUDIED BY LIGHT AND ELECTRON MICROSCOPY FOLLOWING STIMULATION WITH PHYTOHEMAGGLUTININ. I. EFFECT OF PHYTOHEMAGGLUTININ ON THE LYMPHOCYTES OF HEALTHY PERSONS. (Ger.) Orfanos, C. (U. Cologne, Germany), A. Pappas and P. G. Scheurlen. Z. Ges. Exp. Med. 149(4):283-293, 1969.

In 50 lymphocyte cultures from the peripheral blood of normal subjects, 3-5 days of in vitro exposure to phytohemagglutinin (PHA) resulted in morphological transformation of 50-80% of the cells to blast-like or plasma cells. Under the light microscope, the cultures showed small and medium lymphocytes, large RNA-rich (stimulated) cells and macrophages. The PHA-stimulated cells were large and blast-like, with 1 large nucleus (showing disintegration of the chromatin), 1-3 nucleoli, a strongly basophilic cytoplasm, and occasional cytoplasmic vacuoles and pseudopods. Electron microscopic examination showed lymphoblast-like cells, immunoblast-like cells and macrophages. The morphological characteristics of the PHA-exposed cells suggested that immunoglobulin production was limited.

69-2474 BLOOD LYMPHOCYTES STUDIED BY LIGHT AND ELECTRON MICROSCOPY FOLLOWING STIMULATION WITH PHYTOHEMAGGLUTININ. II. TRANSFORMATION OF LYMPHOCYTES BY PHYTOHEMAGGLUTININ IN PATIENTS WITH HODGKIN'S DISEASE AND CHRONIC LYMPHATIC LEUKEMIA. (Ger.) Pappas, A. (U. Cologne, Germany), C. Orfanos and P. G. Scheurlen. Z. Ges. Exp. Med. 149(4):294-305, 1969.

Lymphocyte cultures from the peripheral blood of 25 pts. with Hodgkin's disease (HD) and 17 with chronic lymphocytic leukemia (CLL) were exposed in vitro to phytohemagglutinin (PHA) for 3-5 days. Morphological transformation in these cells (especially from the pts. with CLL) was much less frequent than in the cells from normal subjects (see the preceding abstract). PHA-stimulated cells from pts. with HD were irregularly formed and poor in polyribosomes, with a high frequency of cytoplasmic vacuoles and large numbers of macrophages. PHA-stimulated cells from pts. with CLL were smaller, more regular in outline and less rich in RNA; no macrophages were seen. No immunoblast-like cells were noted in PHA-exposed cultures from pts. with either HD or CLL.

69-2475 A CYTOLOGIC EVALUATION OF INTRACELLULAR TETRACYCLINE FLUORESCENCE IN NORMAL AND NEOPLASTIC LYMPHOCYTES. (E.) Holland, P. (U. Kentucky Med. Ctr., Lexington) and K. Sleamaker. Acta Cytol. (Balt.) 13(4):246-249, 1969.

In lymphocytes from normal subjects and pts. with lymphatic leukemia or infectious mononucleosis, specific tetracycline fluorescence was seen only in the mitochondria. Cells from pts. with acute lymphoblastic leukemia and phytohemagglutinin-transformed lymphocytes showed an increase in the number and size of the mitochondria (by comparison to normal lymphocytes), with a correspondingly increased tetracycline fluorescence, but this method could not differentiate the benign from the leukemic lymphocytes. Cells from pts. with chronic lymphocytic leukemia resembled normal lymphocytes. It is concluded that the cell membrane permeability and the mitochondrial affinity for tetracycline were unrelated to the functional capacity or morphological transformation of the lymphocytes.

69-2476 VARIANT ALKALINE PHOSPHATASE IN HUMAN HEPATOCELLULAR CANCERS. (E.) Warnock, M. L. (U. Chicago, Ill.) and R. Reisman. Clin. Chim. Acta 24(1):5-11, 1969.

A variant (isoenzyme) of nonspecific alkaline phosphatase was found in 8/10 tumor (autopsy) specimens from pts. with hepatocellular cancers, and in 3/5 available sera from these pts. Uninvolved liver tissues adjacent to the tumors contained the normal enzyme. This variant enzyme was also found in 2/60 control specimens from pts. with non-malignant disease (fatty liver in 1/2, active postnecrotic cirrhosis in 1/2), but 10 metastatic liver tumors and 3 primary liver tumors of other types (2 cholangiocarcinomas, 1 liver cell hamartoma) contained the normal enzyme. The electrophoretic mobility, heat stability, substrate specificity, molecular wt., sensitivity to L-phenylalanine and behavior with neuraminidase of this variant differentiated it from normal liver phosphatase. It is hypothesized that the variant may either be unrelated to the normal liver type or some modification of it, and that its presence indicates that carcinogenesis is associated with a cellular modification resulting in production of a different enzyme.

69-2477 DETECTION AND INVESTIGATION OF A NEW TYPE OF ESR SIGNAL CHARACTERISTIC OF SOME TUMOUR TISSUES. (E.) Emanuel, N. M. (Inst. Chem. Physics, USSR Acad. Sci., Moscow), A. N. Saprin, V. A. Shabalkin, L. E. Kozlova and

K. E. Krugljakova. Nature (London) 222(5189): 165-167, 1969.

Frozen samples of several rat and mouse tumors (Walker 256 carcinosarcoma, hepatoma 22a, sarcomas 45, 37 and 180) showed a specific electron spin resonance (ESR) pattern, possibly from a nitrogen-iron complex, which was not found in the ESR spectra of normal rat, mouse or rabbit tissues. After the appearance of a new type of signal, the ESR spectra from other metal-containing complexes in the tumor cells decayed. The results suggested the presence in the tumor tissues of a new, rather stable paramagnetic complex (absent from normal tissues), apparently involved in the metabolism of the tumor cells.

69-2478 CARBOHYDRATE METABOLISM IN EXPERIMENTAL AND HUMAN TUMORS. I. EXPERIMENTAL STUDIES OF CARBOHYDRATE METABOLISM IN RAT TUMORS INDUCED BY DMBA. (It.) Di Bella, S. (U. Turin, Italy), A. Panazzolo, F. Scarpa, P. Cacciari and L. Santoro. Cancro 21(3):267-300, 1968.

In skin tumors induced by 7,12-dimethylbenzanthracene (DMBA) painting in adult male Sprague-Dawley rats, the rates of oxidation of citrate and isocitrate were higher than in skin from untreated controls. The tumor tissues showed higher rates of oxidation for glucose-6-phosphate than for 6-phosphogluconate. Glucose-6-phosphate and phosphogluconate dehydrogenase levels were higher in the tumors than in normal rat skin, but isocitrate dehydrogenase levels were not elevated.

69-2479 QUANTITATIVE DIFFERENCES IN ENERGY METABOLISM BETWEEN EMBRYONAL MOUSE FIBROBLASTS AND VARIOUS MURINE SARCOMAS IN PRIMARY CULTURE. (Ger.) Schwabe, K. (Inst. Cancer Res., German Acad. Sci., Berlin). Arch. Geschwulstforsch. 33(1):39-48, 1969.

Energy metabolism was studied in primary cultures of normal embryonic fibroblasts from mice of 3 inbred strains (CBA/Bln, XVII/Bln or C57BL/Bln) and in primary cultures of 13 transplantable sarcomas (induced by 3,4-benzpyrene, 3-methylcholanthrene, UV irradiation, "PVC" foil or silicone rubber) from mice of the same strains. Aerobic lactate formation was higher in the tumor cells than in the control cultures (this difference might decrease in later in vitro passages of these cells). Since dinitrophenol (DNP)-stimulated aerobic lactate formation was greater in the tumor cells than in the control cells, the tumor cells had a higher glycolytic potential. Since DNP-induced inhibition of protein synthesis under aerobic conditions was greater in the control cultures than in the tumor cells, DNP had little effect on the glycolytic utilization of adenosine triphosphate in the tumor cells. When pyruvate was substituted for glucose under aerobic conditions, levels of protein synthesis were higher in the control cultures than in the tumor cells, suggesting that the tumor cells obtained less energy for protein synthesis from pyruvate than did the control cultures. When this experiment was performed under anaerobic conditions, the results indicated that the tumor cells were more capable of using glycolytic energy under anaerobic conditions than the control cultures.

69-2480 ATTACHMENT OF ASCITES TUMOUR CELLS TO RAT DIAPHRAGM AS SEEN BY SCANNING ELECTRON MICROSCOPY. (E.) Williams, A. E. (U. Birmingham, England) and N. A. Ratcliffe. Nature (London) 222(5196):893-895, 1969.

An electron microscopic method of determining the relative invasiveness of different tumors in vivo was devised. The ultrastructural features of the WBP1 ascites tumor and its attachment to the rat diaphragm are described, with particular reference to the surface structures of the tumor cells.

69-2481 CLINICAL PATHOLOGICAL CONFERENCE: BRONZE DIABETES WITH METASTATIC CARCINOMA. (E.) Ackerman, R. F. and M. P. Meadors, Jr. Memphis Mid-S. Med. J. 44(4): 103-108, 1969.

A hepatoma with bone and regional lymph node metastases was discovered at autopsy in a 62-yr.-old man with hemochromatosis and diabetes mellitus of about 6 yr. duration. A squamous cell carcinoma of the palate, believed to be incidental, had developed 2 mo. before death. In the discussion, the frequency of hepatoma in pts. with hemochromatosis is estimated at 14-25%, and the possible roles of abnormal iron metabolism and cirrhosis in the development of hepatoma are discussed.

69-2482 TO WHAT EXTENT IS X-IRRADIATION RESPONSIBLE FOR THE DEVELOPMENT OF MALIGNANT TUMORS IN CHILDHOOD? II. D STURBANCES OF OSSEOUS DEVELOPMENT IN THE HANDS OF LEUKEMIC CHILDREN. (Ger.) Gefferth, K. (U. Budapest, Hungary). Strahlentherapie 137(4): 442-450, 1969.

An X-ray study of the bones of the hands of 71 leukemic children (under 15) and 125 non-leukemic controls of similar age showed a statistically significant delay of bone development among the leukemic children, both overall and in terms of particular regions of the hand, whether boys and girls were considered separately or together, and when individual bones were considered separately. However, there was no positive correlation between the degree of retardation and the duration or degree of leukemic illness, appearing to confirm that the leukemic children were suffering from a basic constitutional defect before clinical signs of leukemia became manifest. It was concluded that the retardation of osseous development was not a by-product of leukemia but an entity in itself, possibly resulting from a common, as-yet unidentified, organismic anomaly.

69-2483 TRACE METAL ANALYSIS OF CANCEROUS AND NONCANCEROUS HUMAN TISSUES. (E.) Mulay, I. L. (Pennsylvania State U., University Park), R. Roy, B. E. Knox and N. H. Suhr. Fed. Proc. 28(2):692, 1969.

69-2484 LACK OF COMMUNICATION BETWEEN CANCEROUS EPITHELIAL CELLS IN TISSUE CULTURE. (E.) Higashino, S. (Columbia U., New York, N. Y.), C. Borek and W. R. Loewenstein. Fed. Proc. 28(2):684, 1969.

69-2485 CHROMOSOME STUDIES OF HUMAN LYMPHOCYTOID CELL LINES. (E.) Huang, C. C. (Roswell Park Mem. Inst., Buffalo, N. Y.), T. Imamura and G. E. Moore. Fed. Proc. 28(2):804, 1969.

69-2486 CHROMOSOMES OF "MINIMAL DEVIATION" HEPATOMAS: A FURTHER REPORT ON DIPLOID TUMORS. (E.) Nowell, P. C. (U. Pennsylvania Sch. Med., Philadelphia) and H. P. Morris. Cancer Res. 29(4):969-970, 1969.

69-2487 DIFFERENCES IN RNA FROM RAT LIVER AND HEPATOMA REVEALED BY DNA-RNA HYBRIDIZATION. (E.) Mendecki, J. (Inst. Oncol., Gliwice, Poland), B. Minc and M. Chorazy. Biochem. Biophys. Res. Commun. 36(3):494-501, 1969.

69-2488 BETA-GLUCURONIDASE IN CARCINOMA OF THE BLADDER AND EFFECTS OF ITS INHIBITOR. (Jap.) Shiraishi, T. (Hiroshima U. Sch. Med., Japan). Hinyokika Kiyo (Acta Urol. Jap.) 15(3):143-170, 1969.

69-2489 STUDY OF β-GLUCURONIDASE ACTIVITY IN BLADDER TUMORS. (Jap.) Senda, H. (Nagoya U. Sch. Med., Japan), A. Segawa and H. Mitsuya. Nippon Hinyokika Gakkai Zasshi (Jap. J. Urol.) 60(4):331-345, 1969.

69-2490 LEUKEMIA AND AUSTRALIA ANTIGEN. (E.) Sutnick, A. I. (Inst. Cancer Res., Philadelphia, Pa.), W. T. London and B. S. Blumberg. Proc. Amer. Ass. Cancer Res. 10:90, 1969.

69-2491 ONCOGENIC EFFECT OF SHEEP ERYTHROCYTES IN BALB/C MICE. (E.) Tyndall, R. L. (Oak Ridge Nat. Lab., Tenn.) and J. A. Otten. Proc. Amer. Ass. Cancer Res. 10:94, 1969.

69-2492 SPECIFICITY AND STRUCTURAL RELATIONS LEADING TO DUPLICATION OF LATE REPLICATING SEGMENTS AND ENTIRE CHROMOSOMES. (E.) Yerganian, G. (Harvard Sch. Med., Boston, Mass.). Proc. Amer. Ass. Cancer Res. 10:101, 1969.

AUTHOR INDEX

Abelson, H. T. 2388
Ackerman, R. F. 2481
Adamthwaite, S. 2254
Aizawa, C. 2379
Albert, D. M. 2383
Al-Falluji, M. M. 2428
Alpert, M. E. 2208
Alvares, A. P. 2324
Ambrus, J. L. 2384
Ames, R. P. 2416
Anderson, C. K. 2451
Anderson, J. 2367
Anderson, N. G. 2370
Anderson, P. N. 2297
Arcos, J. C. 2279
Armstrong, D. 2359
Arundell, F. D. 2283
Ashikara, T. 2449
Assan, R. 2471
Avila, L. 2342
Axelrod, D. 2374,2380
Azuma, M. 2379

Bagshawe, K. D. 2296
Baker, J. M. 2293
Balls, M. 2334
Bamford, S. B. 2458
Bard, D. S. 2295
Barden, R. P. 2470
Barge, J. 2244
Baron, S, 2410
Basilico, C. 2376
Bates, B. 2413
Bauer, R. 2203
Becker, J. 2331
Bell, C. 2302
Belpomme, D. 2335
Bennington, J. L. 2453
Bensasson, M. 2471
Benyesh-Melnick, M. 2435
Berezovskii, B. S. 2228
Berger, U. 2307
Berndt, H. 2443
Berumen, L. 2335
Best, P. V. 2381
Biberfeld, P. 2347
Biskis, B. O. 2391
Black, P. H. 2373,2426
Blair, D. W. 2381
Blair, P. B. 2362
Blamey, R. W. 2292,2293
Blanchard, J. 2311
Blumberg, B. S. 2490
Boccond-Gibod, L. 2471
Boger, E. 2321
Boitnott, J. K. 2247
Bolande, R. P. 2468
Bollmann, R. 2266
Bond, B. 2284
Bond, H. E. 2361
Bopp, W. 2398
Borek, C. 2484
Borella, L. 2404
Boschetti, A. E. 2308
Bösmüller, H. 2240
Bouchayer, M. 2241
Boutwell, R. K. 2287
Brailovsky, C. 2369
Breedis, C. 2425
Bresnick, E. 2318
Brown, D. E. 2209
Brown, E. R. 2408
Bryan, C. S. 2247
Bryan, G. T. 2327
Bubeník, J. 2352
Bücher, H. O. 2242
Buffett, R. F. 2337,2338
Burdine, J. A., Jr. 2366
Burger, M. M. 2394
Burkhalter, A. 2317
Burlingham, B. T. 2423
Burton, D. S. 2362

Cacciari, P. 2478
Caffrey, M. 2290
Candler, E. L. 2370
Caroline, N. L. 2399
Carp, R. I. 2375
Carrington, M. J. 2302
Carter, R. L. 2254,2289
Cassin, C. 2458
Cassingena, R. 2392
Casto, B. C. 2417,2418
Ceglowski, W. 2401
Chakrabarty, A. 2401
Chan, S. P. 2350
Chapman, A. L. 2398
Chermann, J.-C. 2345
Chiarioni, T. 2472
Chirigos, M. A. 2350
Chorazy, M. 2487
Chou, J. T.-Y. 2298,2299,2300
Christie, G. S. 2274
Cinátl, J. 2356
Clark, G. 2385
Clymer, R. 2340,2341,2400
Codegone, M. L. 2270
Cohen, H. 2398,2405
Cole, P. 2215
Colnaghi, M. I. 2306
Compton, P. 2389
Confer, D. B. 2276
Congdon, C. C. 2427
Conzelman, G. M., Jr. 2253
Cooper, E. H. 2451
Cox, B. 2328
Craddock, V. M. 2256
Cremer, N. E. 2348
Crosby, D. L. 2293
Crout, D. W. 2253
Currie, G. A. 2296
Cutts, J. H. 2301

David, J. 2458
Davidson, C. S. 2208
DeCarvalho, S. 2460
Deckert, M. 2311
Defendi, V. 2430
Deftos, L. J. 2378
De Grouchy, J. 2459
Deinhardt, F. 2414
Delain, E. 2354
Della Torre, G. 2305
Delwaide, P. 2273
Denham, C. 2452
Dérot, M. 2471
De-Thé, G. 2355
DeVita, V. T. 2452
Diamandopoulos, G. Th. 2372
Di Bella, S. 2478
DiBerardino, L. A. 2337,2338
Dimmette, R. M. 2465
Dixon, G. J. 2389
Dodd, M. C. 2428
Doell, R. G. 2397
Doerfler, W. 2423
Doll, R. 2440
Domingo, E. O. 2276
Donald, W. G. 2230
Dondo Lascano, F. 2224
Donner, L. 2356
Dore, J.-F. 2335
Dulbecco, R. 2214
Duplan, J.-F. 2243
Dux, A. 2363

Ebert, J. 2398
Ehrentraut, W. 2262
Emanuel, N. M. 2477
Enders, J. F. 2372
Engle, R. L., Jr. 2200
Erikson, E. 2395
Erikson, R. L. 2395

Farrell, C. 2391
Feller, W. F. 2361
Fenyö, E. M. 2347
Ferreyra, M. E. 2224
Fink, M. A. 2361
Finkel, M. P. 2391
Fisher, C. M. 2464
Fisher, H. W. 2379
Fitzgerald, G. R. 2351
Flanders, L. E., III 2253
Fleissner, E. 2415
Floyd, R. 2435
Fogh, J. 2431,2432
Foley, G. E. 2387
Fournet, L. F. 2467
Friedman, H. 2401
Friedman, M. P. 2424
Friedman, S. B. 2339
Friedmann, G. 2233

AUTHOR INDEX

Friend, C. 2344
Fujita, S. 2449

Gabridge, M. G. 2259
Gaffney, E. V. 2431,2432
Gahrton, G. 2387
Gaillard, J. 2241
Garbut, A. 2324
Gates, A. H. 2283
Gavitt, F. 2414
Gazzolo, L. 2355
Gefferth, K. 2482
Gehle, W. D. 2385
Geissler, E. 2260
Gelboin, H. V. 2332
Gentile, J. M. 2221
Georgii, A. 2382
Gerber, M. 2408
Ghelelovitch, S. 2268
Ghittino, P. 2270
Gibel, W. 2260
Ginsberg, H. S. 2419,2424
Giorgi, R. 2269
Glasgow, L. A. 2339
Goerttler, K. 2275
Gold, R. H. 2216
Goldenberg, H. 2302
Goldner, H. 2433
Goldner, R. 2469
Goodall, C. M. 2263
Grace, J. T., Jr. 2337,2338
Gravelle, C. 2398
Gray, G. F., Jr. 2218
Green, H. 2376
Gregory, K. L. 2439
Griesbach, W. A. 2446
Griffin, M. E. 2468
Grimes, P. A. 2383
Grimley, P. M. 2378
Groupé, V. 2360
Gruenstein, M. 2302
Grundmann, E. 2251
Gulbert, A. 2329

Haasters, J. 2234
Hacker, B. 2437
Hadjiolov, D. 2278
Haguenauer, J. P. 2241
Hall, W. T. 2361,2393
Hanania, G. 2471
Harris, C. 2313
Hartwich, G. 2330,2331
Harvey, E. 2385
Haughton, G. 2312
Hayry, P. 2430
Heath, J. C. 2290
Heer, H. R. 2246
Hellström, P.-Å. 2248
Hennings, H. 2287
Henry, P. H. 2372
Heusghem, C. 2273
Hiasa, Y. 2277
Higashino, S. 2484
Hilf, R. 2302
Hill, J. T. 2271
Hilscher, H. 2260
Hoch-Ligeti, C. 2199
Hodgson, J. R. 2379
Hoffman, H. A. 2388
Holland, P. 2475
Holma, B. 2248
Holmes, E. C. 2364
Homburger, F. 2321
Hook, W. A. 2350
Horáček, J. 2231
Hormia, M. 2441
Horne, M. K. 2386
Howland, R. D. 2317
Hoy, W. E. 2463
Hsiung, G. D. 2436
Huang, C. C. 2485
Huber, P. 2240
Huebner, R. J. 2212,2368,2396, 2409,2410
Hurst, L. 2280

Idänpään-Heikkilä, J. E. 2207
Imagawa, D. T. 2402
Imahori, S. 2411
Imamura, T. 2485
Irving, C. C. 2271
Ito, N. 2277
Ito, T. 2229

Jainchill, J. L. 2370
Jänisch, W. 2265
Jänisch, W. A. 2264
Janss, D. H. 2319
Jasmin, C. 2345
Jasmin, G. 2252
Jasty, V. 2367
Jayle, M.-F. 2280
Jerkofsky, M. A. 2420
Joftes, D. L. 2227
Johnson, E. A. 2276
Juhls, H. 2262

Kadotari, H. 2449
Kaji, H. 2346
Kajima, M. 2412
Kamei, H. 2462
Kanisawa, M. 2291
Kaplow, L. S. 2436
Karas, R. P. 2466
Karasaki, S. 2353
Karasek, M. A. 2283
Karl, S. 2340,2341,2400
Katagiri, M. 2343
Katz, C. 2286
Kawai, K. 2449
Kawinski, W. 2384
Khalifat, R. 2471
King, V. 2308
Kirschstein, R. L. 2374
Kizer, D. E. 2328
Klein, E. 2347
Kleinsasser, O. 2233
Knox, B. E. 2483
Knox, W. E. 2450
Kobayashi, H. 2346
Kodama, T. 2346
Kohler, B. E. 2361
Konishi, Y. 2277
Koprowska, I. 2323
Kori, Y. 2449
Kozlova, L. E. 2477
Kreider, J. W. 2425
Krieg, K. 2267
Krugljakova, K. E. 2477
Kung, T. 2413
Kunte, H. 2272
Kuntzman, R. 2316
Kupfer, G. 2262,2307
Kupfer, M. 2262,2307

Lacassagne, A. 2280
Lacour, F. 2354
Lancaster, L., Jr. 2467
Lane, W. T. 2409
Lattermann, K. 2443
Lausch, R. N. 2288,2429
Lawrence, J. H. 2230
Layne, S. 2429
Le Borgne De Kaouel, C. 2335
Legator, M. S. 2259
Legrand, E. 2243
Lennette, E. H. 2348
Le Page, R. N. 2274
Lesca, P. 2249
Leslie, G. 2406
Leuchtenberger, C. 2311
Leuchtenberger, R. 2311
Levi, P. E. 2451
Levij, I. S. 2285
Levin, M. J. 2372
Levin, W. 2316
Levine, A. S. 2372
Levy, B. 2366
Lewis, A. M. 2368
Li, C. P. 2421
Lijinsky, W. 2250
Linder-Horowitz, M. 2450
Liss, L. 2325
Liu, L. B. 2276
Liu, P. I. S. 2322
Loewenstein, W. R. 2484
Lohs, Kh. 2260
Lombardi, L. 2305
London, W. T. 2490
Lorans, G. 2369
Loveless, J. D. 2432
Lower, G. M., Jr. 2327
Lowry, J. 2320
Lozac'hmeur, M. T. 2244
Lynch, H. T. 2225
Lyons, M. 2413
Lyons, M. J. 2424

Maag, T. 2437
MacMahon, B. 2215

MacPherson, I. 2368,2377
Malinoski, V. F. 2439
Mallet, L. 2333
Malmgren, R. A. 2393
Mancini, L. O. 2367
Mandel, L. R. 2437
Mandelstam, P. 2320
Marantz, C. 2465
Marchiolo, B. 2235
Marczynska, B. 2414
Mariani, T. 2403
Marin, G. 2377
Martin, M. A. 2371,2380
Martino, E. C. 2421
Marugami, M. 2277
Mateos Cándano, M. 2237
Mathé, G. 2335,2345
Mathison, J. B. 2279
Matsen, F. A., III 2366
Matsuya, Y. 2376
May, P. 2392
McAllister, R. M. 2368
McDivitt, R. W. 2218
Meadors, M. P., Jr. 2481
Meezan, E. 2426
Meier, H. 2396
Meisels, A. 2456
Melchionne, S. 2286
Mello, A. 2226
Mello, N. R. 2226
Mendecki, J. 2487
Meranze, D. R. 2302,2433
Meyer, G. 2390
Michel, I. 2302
Mignot, J. 2244
Miller, R. W. 2213
Milt, H. 2220
Minc, B. 2487
Minton, J. P. 2428
Mira, O. J. 2405
Mirand, E. A. 2337,2338,2342
Mitchell, G. W., Jr. 2458
Mitsuya, H. 2489
Möckel, P. 2262
Moloney, J. B. 2349
Moloney, W. C. 2308
Monjour, L. 2269
Montagnier, L. 2390
Moon, R. C. 2319
Moore, G. E. 2462,2485
Morris, H. P. 2450,2486
Morton, D. L. 2364,2393
Mosse, H. 2318
Mouledoux, A. M. 2279
Moulton, J. E. 2253
Mühlbock, O. 2363
Mulay, I. L. 2483
Munroe, I. 2413
Myers, D. D. 2396

Nakai, M. 2402
Nara, K. 2239
Nardi, E. 2472
Nelson, D. S. 2463
Neubauer, R. 2410
Newman, J. T. 2385
Niaussat, P. 2333
Nicolson, M. O. 2368
Nielsen, A. H. 2405
Nikulin, A. 2238
Nishimura, E. T. 2406
Nishimura, R. 2326
Nitze, H. R. 2298,2299,2300
Nomoto, K. 2294
Norris, H. J. 2447
Nowell, P. C. 2486

Oboshi, S. 2343
Olmos Tapia, A. 2237
Ondřej, M. 2261
O'Neill, C. H. 2434
Orfanos, C. 2473,2474
Orr, J. W. 2284
Osato, Y. 2222
Osske, G. 2265
Osswald, H. 2275
Otten, J. A. 2491
Ottenwaelder, J. 2333
Oxman, M. N. 2372
Ozer, H. L. 2374

Panazzolo, A. 2478
Pappas, A. 2473,2474
Paraskevas, F. 2314
Park, H. Y. 2323
Parmiani, G. 2306
Path, M. C. 2451
Paul, D. 2281
Pauluzzi, S. 2366
Pépin, J. M. 2221
Perk, K. 2349
Perry, S. 2452
Petres, J. 2234
Pilch, Y. H. 2295
Pinkerton, H. 2322
Pipkin, G. E. 2326
Piton, C. 2345
Plamenac, P. 2238
Pollard, E. C. 2202
Pollard, M. 2412
Polliack, A. 2285
Pope, J. H. 2386
Porta, G. D. 2306
Porteous, I. B. 2381
Porter, D. D. 2435
Postlethwaite, R. 2381
Potter, M. 2297
Potvliege, P. 2303
Prechtel, K. 2382
Prescott, B. 2421
Proffitt, M. R. 2427
Proto, S. 2235
Provana, A. 2270

Quenum, C. 2269

Rabson, A. S. 2378,2383
Rafferty, N. S. 2334
Raick, A. N. 2310
Rakušanová, T. 2357,2358
Ramos, L. 2431
Rapp, F. 2288,2366,2420,2429
Ratcliffe, N. A. 2480
Raynaud, M. 2345
Reem, G. H. 2344
Rees, E. D. 2320
Reisman, R. 2476
Rhim, J. S. 2409
Rich, M. A. 2340,2341,2400
Rieche, K. 2219
Rigdon, R. H. 2205
Riopelle, J. L. 2252
Ritchie, A. C. 2310
Robbins, P. W. 2426
Robertson, H. T. 2373,2426
Roe, F. J. C. 2254,2289
Rohlfing, S. R. 2408
Rommel, P. 2262
Rondia, D. 2273
Rosemann, G. 2298,2299,2300
Ross, E. 2406
Rowe, W. P. 2388
Roy, R. 2483
Ruben, L. N. 2334
Rubin, R. 2416
Rustrian Azamar, A. 2237
Rüttner, J. R. 2246

Saito, H. 2346
Santoro, L. 2478
Saprin, A. N. 2477
Sarma, P. S. 2355,2410
Sasso, G. F. 2472
Sauer, G. 2375
Saviano, M. S. 2204
Scarpa, F. 2478
Schabel, F. M., Jr. 2389
Scheurlen, P. G. 2473,2474
Schidlovsky, G. 2393
Schilling, G. 2324
Schlegel, J. U. 2326
Schmähl, D. 2206,2275
Schnurrbusch, U. 2262
Schreiber, D. 2264,2265
Schricker, K. T. 2330
Schroeder, H. A. 2291
Schwabe, K. 2479
Schwanitz, G. 2331
Schwartz, S. O. 2408
Segawa, A. 2489
Seido, T. 2343
Seman, G. 2335
Senda, H. 2489
Sendo, F. 2346
Shabalkin, V. A. 2477
Sharp, C. R. 2439
Shimamoto, K. 2449
Shimkin, M. B. 2302
Shinoda, M. 2449
Shirai, T. 2346

AUTHOR INDEX

Shiraishi, T. 2488
Shires, T. K. 2257
Shirley, B. C. 2328
Shiu, G. 2410
Shultz, G. N. 2326
Sibal, L. R. 2361
Sidwell, R. W. 2389
Siegler, E. E. 2444
Siegler, R. 2340,2407
Sievers, S. 2242
Sigmon, E. 2312
Silviano Brandão, H. J. 2457
Sivak, A. 2286
Sleamaker, K. 2475
Smith, G. H. 2388
Smith, K. L. 2349
Smith, K. O. 2385
Smith, R. D. 2309
Sokol, F. 2375,2422
Sovová, V. 2356
Sperber, A. 2458
Springer, K. 2253
Steele, W. J. 2315
Steeves, R. A. 2342
Steinhoff, D. 2251
Stenger, R. J. 2276
Stevens, G. M. 2445
Stevens, J. 2334
Stoker, M. G. P. 2210
Strandstrom, H. V. 2384
Strong, L. C. 2365
Stukonis, M. 2440
Subko, E. 2325
Sugawara, K. 2222
Suhr, N. H. 2483
Sutnick, A. I. 2490

Takemoto, K. K. 2374
Takeoka, O. 2449
Takeya, K. 2294
Taylor, D. O. N. 2348
Taylor, H. B. 2447
Temin, H. M. 2211
Tennant, J. R. 2336
Tevethia, S. S. 2429
Theuring, F. 2217
Thiel, J. F. 2385
Thomas, C. 2266
Thomson, S. 2342
Tison, M. J. 2279
Todaro, G. J. 2213
Tomatis, L. 2250,2263
Tournier, P. 2392
Toury, J. 2269
Toutain, D. 2249
Treger, A. 2321
Trentin, J. J. 2417,2418
Trousdale, M. D. 2385
Truhaut, R. 2249
Turano, A. 2352
Turner, H. C. 2409
Tyndall, R. L. 2491

Ure, D. M. J. 2461

Valér, M. 2329
Van Duuren, B. L. 2286
Van Hoosier, G. L. 2417,2418
Van Zwijndregt, H. A. 2236
Veazey, R. A. 2271
Velicer, L. F. 2419
Venuat, A.-M. 2335
Veselý, P. 2356
Vigier, P. 2355,2390
Viola, M. V. 2349
Vonka, V. 2435
Von Sallmann, L. 2383
Vuori, E. E. J. 2441

Waelbroeck-Van Gaver, C.
2303,2304
Wagner, J. 2312
Wähmer, M. 2262
Walike, J. W. 2466
Wallis, L. A. 2200
Waltz, T. A. 2366
Warnock, M. L. 2476
Warren, K. S. 2276
Warzok, R. 2264
Webb, M. 2290
Weeks, J. R. 2378
Weiler, O. 2354
Weiss, D. W. 2362
Wenyon, C. E. M. 2250
Werder, A. A. 2405
Wetters, E. J. 2386
Wheelock, E. F. 2399
Wildner, G. P. 2260
Wilkinson, J. L. 2442
Williams, A. E. 2480
Williams, R. E. 2451
Winchell, H. S. 2230
Wirth, G. 2232
Wittbrodt, S. 2260
Wivel, N. A. 2349
Wold, J. W. 2315
Wolfe, J. N. 2223
Wolff, E. 2459
Wood, M. 2255
Wu, H. 2426

Yamamoto, K. 2222
Yamashita, S. 2449
Yasuhira, K. 2282
Yates, V. J. 2367
Yerganian, G. 2492
Yokoro, K. 2229

Zimmermann, F. K. 2258
Zintzsch, J. 2262
Zobl, H. 2382
Zur Hausen, H. 2422

SUBJECT INDEX

- ABNORMALITIES, CONGENITAL
  - skin (ichthyosis), with tongue cancer, child: 2467
- ABSORPTION, INTESTINAL
  - benzpyrene, methylcholanthrene or dimethylbenzanthracene, rat: 2320
- ACETAMIDE, THIO-
  - effect on cortisone-induced enzyme, rat liver: 2328
- 2-ACETYLAMINOFLUORENE (See N-2-Fluorenylacetamide)
- ADRENAL CORTEX
  - dimethylbenzanthracene toxicity, mouse or rat: 2284,2313
- ADRENAL NEOPLASMS
  - congenital regressing and maturing neuroblastoma, siblings: 2468
- AFLATOXIN(S)
  - liver toxicity and tumors, animal and human, review: 2208
  - toxicity, liver and testis, monkey: 2269
- AFLATOXIN B-1
  - effect on dimethylbenzanthracene skin carcinogenesis, mouse: 2286
  - hepatoma, trout: 2270
- AFLATOXIN B-2
  - hepatoma, trout: 2270
- AIR POLLUTION
  - poisonous gases, cancer incidence, Ohio (Cleveland): 2439
- ANDROGENS (See under Hormones)
- ANTHRANILIC ACID, 3-HYDROXY- (tryptophan metabolite)
  - bladder tumors, effect of ascorbate, mouse: 2326
- ANTIMONY
  - trace levels, spontaneous tumor incidence, animal: 2291
- ANTITUMOR AGENTS
  - actinomycin D, effect on SV40 DNA, monkey kidney cells: 2375
  - clam extract, effect on adenovirus 12 tumors, hamster: 2421
  - effect on dimethylbenzanthracene skin carcinogenesis, mouse: 2286
  - 6-mercaptopurine and porfiromycin, effect on Friend virus leukemia, mouse: 2389
  - mutagenesis, bacteria (mouse infection), method: 2259
- ARSENIC
  - occupational exposure, skin cancer: 2329
  - trace levels, spontaneous tumor incidence, animal: 2291
- ASCORBIC ACID
  - effect on hydroxyanthranilic acid bladder tumors, mouse: 2326
- AZOBENZENE, 4-DIMETHYLAMINO-
  - liver tumors
    - effect of C-21 steroids or o,p'DDD, rat: 2280
    - glucose-6-phosphatase activity, rat: 2278
- AZOBENZENE, 2-METHYL-4-DIMETHYLAMINO-
  - effect on liver mitochondrial contractility, rat: 2279
- AZOBENZENE, 3'-METHYL-4-DIMETHYLAMINO-
  - hepatoma, mitochondrial contractility, rat: 2279
- 5-AZOTOLUENE, 2-AMINO-
  - liver tumors, effect of schistosomiasis, mouse: 2276

- 1,2-BENZANTHRACENE
  - mutagenesis, yeast: 2258
- BENZANTHRACENE, 1,2,3,4-DI-
  - effect on DNA and RNA, mouse skin: 2281
- BENZANTHRACENE, 1:2,5:6-DI-
  - mutagenesis, yeast: 2258
- BENZANTHRACENE, 7,12-DIMETHYL-
  - effect on DNA and RNA, mouse skin: 2281
  - intestinal absorption, rat: 2320
  - lung or ovary tumors and lymphoma, fetal mouse: 2263
  - mammary tumors, hormone sensitivity, rat: 2302
  - mutagenesis, *Saccharomyces*: 2258
  - s.c. sarcoma, immunity, hamster: 2288
  - skin tumors
    - carbohydrate metabolism, rat: 2478
    - chemotherapy, mouse: 2286
    - DNA metabolism, mouse: 2287
    - hairless and/or asebic mice: 2283
    - mouse: 2284
  - toxicity
    - adrenal, mechanism, rat: 2313
    - ovary and adrenal, mouse: 2284
  - uptake, effect of endocrine ablation, rat mammary gland: 2319
  - + vitamin A, hamster cheek pouch tumors: 2285
- BENZANTHRACENE, 9,12-DIMETHYL-
  - effect on DNA, mouse liver: 2310
- BENZENE
  - leukemia, chromosomes, human: 2330,2331
- BENZO(rst)PENTAPHENE (See Benzpyrene, 3,4,9,10-di-)
- 3,4-BENZPYRENE
  - intestinal absorption, rat: 2320
  - intranuclear distribution, normal cells: 2257
  - lung tumors, DNase activity, mouse: 2249
  - marine phytoplankton *in vitro*: 2333
  - microsomal metabolism, liver cells: 2272, 2273,2324,2332
  - mutagenesis, yeast: 2258
  - tumor induction, effect of adenovirus 12-infected or transformed cells, hamster: 2322
- BENZPYRENE, 3,4,9,10-DI-
  - s.c. sarcoma, effect of citrus oils, mouse: 2321
- BILIARY TRACT NEOPLASMS
  - epidemiology, review: 2218
- BLADDER CARCINOGENESIS
  - fluorenylacetamide, strain and sex difference, mouse: 2255
  - hydroxyanthranilic acid, effect of ascorbate, mouse: 2326
  - 2-naphthylamine, monkey: 2253

BLADDER NEOPLASMS
- cell growth rates and ploidy: 2451
- β-glucuronidase metabolism: 2488,2489

BLOOD
- cells, infectious mononucleosis, leukemia-like DNA, RNA and protein content: 2387
- coagulation, and formation of metastases, review: 2219
- groups, acquisition of B antigen, colon cancer: 2465
- hemoglobin types, leukemia and related diseases: 2472
- lymphocytes, phytohemagglutinin transformation, Hodgkin's disease or leukemia: 2474
  - mitochondrial tetracycline fluorescence: 2475
  - normal human: 2473

BONE
- growth retardation, leukemia, child: 2482

BONE MARROW
- kinetics of normal cells, mouse: 2452

BONE NEOPLASMS
- osteosarcoma, human, sarcoma virus isolation and hamster tumors: 2391
- radiation-induced, skull, human: 2233
- sarcoma, serum virus antibodies, human: 2393

BRAIN NEOPLASMS (See also Nervous system neoplasms)
- epidemiology, worldwide: 2438
- induction
  - avian adenovirus (CELO), hamster: 2367
  - methylnitrosourea, orchiectomized rat: 2264
    - rat: 2266
  - polyoma virus, rabbit: 2381
  - simian adenovirus (SA7), hamster: 2366
- mouse glioblastoma, morphine stimulation _in vitro_: 2325
- reticulum cell sarcoma, with malabsorption, human: 2464
- virus-like particles, mouse: 2416

BREAST NEOPLASMS (See under Mammary neoplasms, human)

BRONCHUS
- squamous metaplasia with atypia, occupational, singers or wind instrument players: 2238

CADMIUM
- trace levels, spontaneous tumor incidence, animal: 2291

CARBOHYDRATES
- metabolism, induced skin tumors, rat: 2478

CARCINOGENESIS, CHEMICAL
- animal, methods, review: 2206
- benzpyrene, effect of adenovirus 12-infected or transformed cells, hamster: 2322
- plastics and metals, mechanism, review: 2209

CARCINOGENS, CHEMICAL
- dietary, socioeconomic and occupational variation, stomach cancer, England + Wales: 2440
- occupational exposure, cancer incidence, chemists, U.S.: 2245

CELL GROWTH KINETICS
- bladder or ureter cancer, human: 2451

CELL GROWTH KINETICS (Contd.)
- cervix cancer, human: 2453
- induced ear duct tumors, rat: 2300
- normal and leukemic WBC, mouse: 2452
- relation to glutaminase activity, rat hepatoma: 2450
- stomach cancer, human: 2449

CERVIX UTERI
- effect of intrauterine contraceptive device, human: 2237

CERVIX UTERI NEOPLASMS
- atypical epithelial dysplasia, DNA content and aneuploidy: 2457
- carcinogen-induced, epithelial-mesenchymal interactions, mouse: 2323
- cell growth kinetics: 2453
- epidemiology, Ohio (Cleveland), aged: 2444
- possible transmission, _Trichomonas vaginalis_: 2456
- sex chromosomes: 2458
- with dermatomyositis: 2471

CHROMIUM
- s.c. sarcoma, rat: 2289
- trace levels, spontaneous tumor incidence, animal: 2291

CHROMOSOMES
- aneuploidy, premalignant lesions of cervix: 2457
- benzene-induced leukemia, human: 2330,2331
- bladder or ureter cancer: 2451
- cell lines, leukemia and related diseases, human: 2485
- estrogen-induced pituitary tumors, male rat: 2304
- human cancer, review: 2199,2224
- liver metastasis from stomach cancer, human: 2459
- LSD-induced abnormalities, human, review: 2207
- "minimal-deviation" rat hepatomas: 2486
- radiation-induced leukemia, radiation chimera, mouse: 2243
- sex, cancer or premalignant diseases of cervix or endometrium, human: 2458
- specific abnormalities, spontaneous or virus-induced, cell line: 2492

CHRYSENE, 6-AMINO-
- liver and lung tumors, mouse: 2254

COBALT
- rhabdomyosarcoma, mechanism of action, rat: 2290

COCARCINOGENESIS
- vitamin A and dimethylbenzanthracene, cheek pouch, hamster: 2285

COLLAGEN DISEASES (See under Immunity disorders)

COLON NEOPLASMS
- ABO blood groups, acquisition of B antigen, case: 2465
- trace metal content, human: 2483

CORPUS UTERI NEOPLASMS
- endometrial cancer, sex chromosomes: 2458

CROTON OIL
- fraction A-1, effect on DNA and RNA, mouse skin: 2281
- + methylcholanthrene, foot appendage tumors, snail: 2267

- CROTON OIL (Contd.)
  - + urethan, skin tumors, effect of thymectomy, mouse: 2282

- o,p'-DDD (See Ethane, 1,1-dichloro-2-(o-chlorophenyl)-2-(p-chlorophenyl)-)
- DIETARY FACTORS (See also under Foods)
  - socioeconomic and occupational variations, stomach cancer, England and Wales: 2440
- DIETHYLSTILBESTROL
  - pituitary tumors, rat: 2303,2304
- DISEASE OUTBREAKS
  - reticulum cell sarcoma, Japanese quail colony, attempted virus isolation: 2406
- DISEASE TRANSMISSION
  - maternal-fetal, leukemia virus, mouse: 2337, 2338
  - possible, *Trichomonas vaginalis*, cervix cancer: 2456
  - Yaba poxvirus, insect vectors, monkey colony (New York): 2384

- EAR DUCT NEOPLASMS
  - dimethylaminostilbene-induced, animal: 2298, 2299,2300
- ENDOCRINE ABLATION (See also under Hormones)
  - effect on carcinogen uptake, rat mammary gland: 2319
  - orchiectomy, effect on methylnitrosourea induction of CNS tumors, rat: 2264
- ENDOMETRIUM (See under Corpus uteri)
- ENVIRONMENTAL FACTORS
  - socioeconomic and occupational, stomach cancer, England + Wales: 2440
- ENZYMES
  - alkaline phosphatase, variant, human liver tumors: 2476
  - benzpyrene hydroxylase, metabolism, liver cells: 2272,2273
  - carbohydrate-mobilizing, induced skin tumors, rat: 2478
  - damage by atmospheric $^{14}CO_2$, mechanism: 2227
  - distribution, methylnitrosourea-induced nerve tumors, rat: 2265
  - glucose-6-phosphatase, dimethylaminoazobenzene liver tumors, rat: 2278
  - β-glucuronidase, bladder cancer: 2488,2489
  - glutaminase, relationship to growth rate, rat hepatoma: 2450
  - neuraminidase, effect on tumor-specific immunity, methylcholanthrene sarcoma, mouse: 2296
  - spleen, virus-induced mouse leukemia, properties: 2344
  - thymidine kinase, deficient cell line, polyoma virus infection: 2376
  - transfer RNA methylase, virus-induced liver tumor, chick: 2437
  - tryptophan oxygenase (cortisone-induced), effect of thioacetamide, rat liver: 2328
  - uridine diphosphate glucuronyltransferase, effect of 3-methylcholanthrene, rat liver: 2317
- EPIDEMIOLOGY
  - all tumors
    - chemists, U.S.: 2245
    - children, review: 2217
    - Japan: 2448
    - U.S.: 2454
      - males: 2455
  - breast cancer
    - California (2 cities): 2445,2446
    - detection of high-risk group (estrogen excretion), review: 2215
    - males, prognosis: 2447
    - mammography, review: 2216
  - Burkitt lymphoma and other tumors, children, Sierra Leone: 2442
  - cervix cancer
    - Ohio (Cleveland), aged: 2444
    - *Trichomonas vaginalis* infections, Canada (Quebec): 2456
  - CNS tumors, worldwide: 2438
  - gallbladder and bile duct cancer, review: 2218
  - leukemia
    - hemoglobin type distribution, Italy: 2472
    - radiation exposure, review: 2203
  - liver tumors, mycotoxins, review: 2208
  - lung cancer
    - exposure to poisonous gases, Ohio (Cleveland): 2439
    - silicosis, Switzerland: 2246
    - smoking, review: 2205
    - uranium miners, Czechoslovakia (Jáchymov), smoking: 2231
  - mucosal melanoma of head and neck, Finland: 2441
  - myeloma and related diseases, review: 2200
  - stomach cancer, England + Wales, socioeconomic and occupational groups: 2440
  - Yaba poxvirus infection, insect vectors, monkey colony (New York): 2384
- EPSTEIN-BARR VIRUS (See under Virus, herpes-type)
- ESOPHAGUS NEOPLASMS
  - caustic burn scar, role of repeated diltation: 2241
- ESTROGENS (See under Hormones; see also Diethylstilbestrol and Estrone)
- ESTRONE
  - mammary tumors, androgen response, rat: 2301
- ETHANE, 1,1-DICHLORO-2-(o-CHLOROPHENYL)-2-(p-CHLOROPHENYL)- (o,p'-DDD)
  - effect on liver carcinogenesis, rat: 2280
- ETHIONINE
  - effect on m-toluenediamine liver carcinogenesis, rat: 2277
- EYE NEOPLASMS
  - lens, induction, SV40, hamster: 2383

- N-2-FLUORENYLACETAMIDE
  - bladder and liver tumors, strain and sex difference, mouse: 2255
  - mechanism of action, nucleic acid binding: 2271
  - + polyoma virus, liver, kidney and s.c. tumors, rat: 2309
- N-2-FLUORENYLACETAMIDE, N-HYDROXY-
  - mechanism of action, nucleic acid binding: 2271

FLUORIDE
  trace levels, spontaneous tumor incidence, animal: 2291
FOODS (See also under Dietary factors)
  toxic and carcinogenic mycotoxins, review: 2208
FUNGI AND FUNGAL EXTRACTS
  hepatotoxicity and hepatocarcinogenesis, animal and human, review: 2208
FUSEL OIL
  mutagenesis, mouse and bacteria: 2260

GALLBLADDER NEOPLASMS
  epidemiology, review: 2218
GASTROINTESTINAL CARCINOGENESIS
  methylnitrosourea, rat: 2266
  nitrosoheptamethyleneimine or nitrosooctamethyleneimine, rat: 2250
GASTROINTESTINAL DISEASES
  celiac disease, reticulum cell sarcoma of brain: 2464
  ulcer, postgastrectomy cancer of gastric stump: 2240
GENETICS, ANIMAL
  dimethylbenzanthracene skin tumors, hairless and/or asebic mice: 2283
  "host range variants" of leukemia virus, strain differences, mouse: 2396
  strain difference, fluorenylacetamide bladder or liver tumors, mouse: 2255
GENETICS, HUMAN
  cancer risk, detection method, review: 2213
  heredity and cancer, review: 2225
  high-cancer-risk diseases, Australia antigen: 2490
  nevoid basal cell carcinoma with benign odontogenic myxoma of jaw: 2466
  regressing and maturing neuroblastoma, siblings: 2468
GENETICS, MICROBIAL
  polyoma virus, transformed or productively infected cells: 2380
GERMANIUM
  trace levels, spontaneous tumor incidence, animal: 2291

HALLUCINOGENS
  LSD, toxicity, human, review: 2207
HEAD AND NECK NEOPLASMS
  mucosal melanoma, epidemiology, Finland: 2441
HORMONES (See also under Endocrine ablation)
  androgens, sensitivity, estrone-induced mammary tumor, rat: 2301
  C-21 steroids, effect on dimethylaminoazobenzene liver carcinogenesis, rat: 2280
  disorders of metabolism, breast cancer: 2443
  estrogen fractions, breast cancer risk, review: 2215
  metabolism, estrogen-induced pituitary tumors, rat: 2303
  pituitary-adrenal and thyroid function, ^{90}Sr carcinogenesis, rat: 2228

HORMONES (Contd.)
  pituitary graft, effect on malignant transformation of hyperplastic mammary nodules, mouse: 2363
  sensitivity, induced mammary tumors, rat: 2302
  sex, effect on fluorenylacetamide bladder or liver tumors, mouse: 2255
  thyrocalcitonin and prostaglandin, SV40-transformed human thyroid cancer culture: 2378
HYDROCARBONS, ALIPHATIC
  Pristane (2,6,10,14-tetramethylpentadecane), plasma cell tumors, mouse: 2297
HYDROCARBONS, POLYCYCLIC AROMATIC
  effect on benzpyrene hydroxylation, mouse liver microsomes: 2272

IMMUNITY
  Australia antigen, leukemia and high-cancer-risk diseases, human: 2490
  cellular, Burkitt lymphoma cell line (P3-J) *in vitro*: 2462
  complement-fixing antigen, and herpes-type virus, human leukemia and lymphoma cell lines: 2386
  dimethylbenzanthracene sarcoma, hamster: 2288
  effect of ethylnitrosourea, guinea pig: 2307
  human cancer or leukemia: 2460
  immunization, mammary tumor virus, mouse: 2362
  leukemia virus resistance, interferon effect, mouse: 2339
  methylcholanthrene sarcoma, mouse or rat: 2292, 2293,2294,2295,2296,2312,2463
  mouse mammary tumor virus, detection, method: 2361,2364
  rabbit antiserum, effect on Moloney virus sarcomas, mouse: 2350
  skin carcinogenesis, role of thymus, mouse: 2282
  strain-specific or -nonspecific tumor, mouse: 2463
  surface antigens, virus-transformed cells: 2373,2429,2430,2434
    cell membrane properties: 2394,2426
  SV40-specific RNA, and S and T antigens, transformed hamster cells: 2372
  tumor antigen, adenovirus 31 hamster tumor, properties: 2370
  tumor-specific antigens, viral or chemical thymic lymphoma, mouse: 2397
IMMUNITY DISORDERS
  collagen diseases, cancer pathogenesis, human: 2226,2470
  dermatomyositis, cancer of cervix: 2471
  discoid lupus erythematosus, skin cancer: 2469
  hay fever-type allergy or pregnancy sickness, negative association with cancer: 2461
  myeloma and related diseases, review (book): 2200
  polyoma virus-induced runting, effect of antilymphocyte serum, mouse: 2428
IMMUNOSUPPRESSION
  antilymphocyte serum, effect on polyoma virus sensitivity, mouse: 2428

IMMUNOSUPPRESSION (Contd.)
- mineral oil plasma cell tumors, mouse: 2314
- Rauscher leukemia virus, spleen cell implants, mouse: 2404
- urethan, relationship to leukemogenesis, mouse: 2306

INJURIES (See also under Scar tissue)
- burns, skin cancer, cases and review: 2204
- caustic, esophagus, cancer development: 2241
- compound nevus, transformation to melanoma: 2242
- respiratory epithelium, squamous metaplasia, singers or wind instrument players: 2238

INTERFERON
- effect on
  - leukemia virus resistance, mouse: 2339
  - mouse sarcoma virus, normal cells: 2351
- induction
  - Statolon, effect on Friend leukemia virus infection, mouse: 2399
  - synthetic RNA polymer, effect on viral sarcoma, mouse: 2410

IRON
- metabolism disorder (hemochromatosis), with hepatoma: 2481

ISOTHIOCYANATE, α-NAPHTHYL-
- effect on m-toluenediamine liver carcinogenesis, rat: 2277

KIDNEY CARCINOGENESIS
- diethylnitrosamine, swine: 2275
- dimethylnitrosamine, tumor classification, rat: 2252
- fluorenylacetamide + polyoma virus, rat: 2309
- polyoma virus, sarcoma, rat: 2382

LACTATION
- leukemia virus transmission, mouse: 2337,2338

LARYNX NEOPLASMS
- carcinoma, after radiotherapy of larynx sarcoma: 2232

LEAD
- trace levels, spontaneous tumor incidence, animal: 2291

LEUKEMIA, EXPERIMENTAL (See also under Virus, leukemia/lymphoma)
- cell growth kinetics, mouse: 2452
- L_2C/NB (guinea pig), herpes-like virus: 2436
- spontaneous
  - dog, cellular transmission: 2398
    - transmission to mice, properties: 2405
  - incidence, effect of methylcholanthrene or radiation, rat: 2308

LEUKEMIA, HUMAN
- acute lymphatic
  - cell line, virus particles: 2335
  - mitochondrial tetracycline fluorescence: 2475
- Australia antigen: 2490
- cell lines
  - chromosomes: 2485

LEUKEMIA, HUMAN (Contd.)
  - QIMR-WIL, herpes-type virus and complement-fixing antigen: 2386
- child, retarded bone growth: 2482
- chromosomes, review: 2224
- chronic lymphatic
  - mitochondrial tetracycline fluorescence: 2475
  - phytohemagglutinin transformation, WBC cultures: 2474
- collagen diseases, pathogenesis: 2470
- distribution of hemoglobin types: 2472
- leukemia-like patterns of DNA, RNA and protein, WBC, infectious mononucleosis: 2387
- radiation-induced
  - ^{32}P-treated polycythemia vera: 2230
  - review: 2203
- specific immunity: 2460
- transmission to mice, properties: 2405
- virus studies, review: 2221

LEUKEMOGENESIS, EXPERIMENTAL
- chemical or viral, tumor-specific antigens, thymic lymphoma, mouse: 2397
- dimethylbenzanthracene, lymphoma, fetal mouse: 2263
- methylnitrosourea, rat: 2266
- mineral oil (plasma cell tumors), immunosuppression, mouse: 2314
- Pristane (2,6,10,14-tetramethylpentadecane), plasma cell tumors, mouse: 2297
- urethan, and immunosuppression, mouse: 2306
  - virus-like particles, mouse: 2305

LEUKEMOGENESIS, HUMAN
- benzene, chromosome abnormalities: 2330,2331

LEUKOSIS, AVIAN (See also under Marek's disease)
- group-specific antigens, immunized chickens: 2359

LIVER
- aflatoxin toxicity, monkey: 2269
- DNA, effect of dimethylbenzanthracene, mouse: 2310
- extract, effect on mammary tumor virus-induced tumors, mouse: 2365
- microsomes
  - benzpyrene hydroxylase, rat or mouse: 2272, 2273,2324
  - carbon monoxide-binding particles, effect of methylcholanthrene, rat: 2316
  - methylcholanthrene metabolism, rat: 2318
- mitochondrial contractility, effect of carcinogens, rat: 2279
- RNA transcription, effect of methylcholanthrene, rat: 2315
- tryptophan oxygenase (cortisone-induced), effect of thioacetamide, rat: 2328
- uridine diphosphate glucuronyltransferase, effect of methylcholanthrene, rat: 2317

LIVER CARCINOGENESIS
- aflatoxin B-1 and B-2, trout: 2270
- aminoazotoluene, effect of schistosomiasis, mouse: 2276
- aminochrysene, mouse: 2254
- dichlorodiaminodiphenylmethane, rat: 2251
- diethylnitrosamine, swine: 2275
- dimethylaminoazobenzene
  - effect of C-21 steroids or o,p'DDD, rat: 2280

- LIVER CARCINOGENESIS (Contd.)
    - glucose-6-phosphatase activity, rat: 2278
  - dimethylnitrosamine, rabbit: 2274
  - fluorenylacetamide
    - + polyoma virus, rat: 2309
    - strain and sex difference, mouse: 2255
  - GA virus (associated with Marek's disease), RNA methylase activity, chick: 2437
  - methyldimethylaminoazobenzene, mitochrondrial contractility, rat: 2279
  - mycotoxins (including aflatoxin), animal and human, review: 2208
  - m-toluenediamine, effect of other carcinogens, rat: 2277
  - urethan, mouse: 2306
- LIVER NEOPLASMS
  - chromosomes
    - metastasis from stomach cancer, human: 2459
    - "minimal-deviation" rat hepatomas: 2486
  - epidemiology, mycotoxins, review: 2208
  - hemochromatosis: 2481
  - Novikoff hepatoma (rat), virus-like particles: 2353
  - relationship of growth rate to glutaminase activity, rat: 2450
  - RNA analysis, rat: 2487
  - surface contact of cells *in vitro*, rat: 2484
  - variant alkaline phosphatase, human: 2476
- LUNG
  - toxicity, tobacco smoke, rabbit: 2248
- LUNG CARCINOGENESIS
  - aminochrysene, mouse: 2254
  - benzpyrene, DNase activity, mouse: 2249
  - dichlorodiaminodiphenylmethane, rat: 2251
  - dimethylbenzanthracene, fetal mouse: 2263
  - nitrosoheptamethyleneimine or nitrosooctamethyleneimine, rat: 2250
  - possible, mineral oil, human: 2247
  - tobacco smoke, animal, review: 2205
  - urethan, mouse: 2306
- LUNG NEOPLASMS
  - epidemiology, silicosis, Switzerland: 2246
  - exposure to poisonous gases, Ohio (Cleveland): 2439
  - scar carcinoma: 2239
  - smoking, review: 2205
  - trace metal content, human: 2483
  - uranium miners, smoking, Czechoslovakia (Jáchymov): 2231
- LYMPHATIC TISSUE
  - methylcholanthrene sarcoma immunity, rat: 2292
- LYMPHOMA, MALIGNANT, EXPERIMENTAL
  - spontaneous
    - dog, cellular transmission: 2398
    - reticulum cell sarcoma, Japanese quail, attempted virus isolation: 2406
    - transmissible, amphibian (*Xenopus*): 2334
- LYMPHOMA, MALIGNANT, HUMAN
  - Burkitt type
    - cell lines
      - attempted EB virus rescue: 2435
      - chromosomes: 2485
      - complement-fixing antigen and herpes-type virus: 2386
      - P3-J, antibody production *in vitro*: 2462
- LYMPHOMA, MALIGNANT, HUMAN (Contd.)
    - epidemiology, children, Sierra Leone: 2442
  - cell lines, chromosomes: 2485
  - epidemiology, chemists, U.S.: 2245
  - Hodgkin's disease, phytohemagglutinin transformation of lymphocyte cultures: 2474
  - isolation and properties of adenovirus type 1: 2368
- LYSERGIC ACID DIETHYLAMIDE (See under Hallucinogens)

- MALIGNANT TRANSFORMATION
  - carcinogen-treated cervix or ovary tissue, epithelial-mesenchymal interactions, mouse: 2323
  - discoid lupus erythematosus to skin cancer: 2469
  - hemochromatosis to hepatoma: 2481
  - hyperplastic mammary nodules to carcinoma, pituitary hormone effects, mouse: 2363
  - nevus to melanoma, traumatic, human: 2242
  - spontaneous, malignancy of transformed marmoset kidney cells: 2414
- MAMMARY GLAND
  - dimethylbenzanthracene uptake, effect of endocrine ablation, rat: 2319
- MAMMARY NEOPLASMS, EXPERIMENTAL (See also under Virus, mammary tumor)
  - dimethylbenzanthracene-induced, hormone sensitivity, rat: 2302
  - estrone-induced, androgen sensitivity, rat: 2301
  - mammary tumor virus-positive mice, effect of liver extract: 2365
  - methylcholanthrene-induced, hormone sensitivity, rat: 2302
- MAMMARY NEOPLASMS, HUMAN
  - associated endocrine diseases: 2443
  - epidemiology, California (2 cities): 2445,2446
  - frequency, male: 2447
  - mammography, review: 2216
  - risk, estrogen excretion pattern, review: 2215
    - "prominent duct" pattern, review: 2223
  - trace metal content: 2483
- MAREK"S DISEASE (See also under Leukosis, avian)
  - cross-reactivity with avian leukosis-sarcoma virus, chicken: 2359
- MAREK'S DISEASE VIRUS (See under Virus, herpes-type)
- METABOLISM (glycolysis and respiration)
  - embryonic and tumor cells, comparison, mouse: 2479
  - induced ear duct tumors, rat: 2299
- METABOLISM DISORDERS
  - hemochromatosis, with hepatoma: 2481
- METALS
  - electron spin resonance spectra, normal and tumor cells: 2477
  - mechanism of tumor induction, review: 2209
  - trace, malignant and normal human tissues (breast, lung, colon): 2483
    - spontaneous tumor incidence, animal: 2291
- METHANE, 3,3'-DICHLORO-4,4'-DIAMINODIPHENYL-
  - lung and liver tumors, rat: 2251

3-METHYLCHOLANTHRENE
  + croton oil, foot appendage tumors, snail: 2267
  effect on
    carbon monoxide-binding particles, rat liver: 2316
    RNA, rat liver: 2315
    spontaneous leukemia incidence, rat: 2308
    m-toluenediamine liver carcinogenesis, rat: 2277
    uridine diphosphate glucuronyltransferase, rat liver: 2317
  intestinal absorption, rat: 2320
  mammary tumors, hormone sensitivity, rat: 2302
  metabolism, microsomes, rat liver: 2318
  s.c. sarcoma, immunity and RES function, mouse or rat: 2292,2293,2294,2295,2296,2312,2463
  skin tumors, effect of thymectomy, mouse: 2282
MORPHINE SULFATE
  stimulation, mouse brain tumor *in vitro*: 2325
MOUTH NEOPLASMS
  benign odontogenic myxoma of jaw, nevoid basal cell carcinoma syndrome: 2466
  tongue cancer, congenital ichthyosis, child: 2467
MUCOPOLYSACCHARIDES, ACID
  production, Rous sarcoma virus-transformed chicken or mammalian cells: 2358
MUSCLE NEOPLASMS
  rhabdomyosarcoma, cobalt induction, mechanism, rat: 2290
MUTAGENESIS
  atmospheric $^{14}CO_2$, testing method, mouse: 2227
  carcinogens and alkylating agents, bacterial infection (mouse), method: 2259
  fusel oil, bacteria and mouse: 2260
  methylnitrosamine or methylnitrosourethan, *Drosophila*: 2261
  polynuclear hydrocarbons, yeast: 2258
MYELOMA AND RELATED DISEASES
  epidemiology, review (book): 2200
  plasma cell tumors, induction, aliphatic hydrocarbon, mouse: 2297
      mineral oil, mouse: 2314

β-NAPHTHYLAMINE
  bladder tumors, monkey: 2253
NEOPLASMS, EXPERIMENTAL
  chemical induction, methods, review: 2206
  electron spin resonance spectra: 2477
  formation of metastases, and blood coagulation, review: 2219
  induced, aerobic and anaerobic glycolysis, comparison with embryonic cells *in vitro*, mouse: 2479
  invasiveness *in vivo*, method of measurement: 2480
  mouse sarcoma, sheep RBC induction: 2491
  rat tumors, effect of mouse leukemia virus: 2346
  sarcoma, induction by plastics or metals, mechanism, review: 2209
  Sarcoma I (mouse), immunity: 2463
NEOPLASMS, EXPERIMENTAL (Contd.)
  spontaneous, effect of dietary trace elements, mouse or rat: 2291
  SV40-induced, surface antigens: 2430
NEOPLASMS, HUMAN
  chromosomes and immunity, review (book): 2199
  epidemiology
    children, review: 2217
    Japan: 2448
    U.S.: 2454
  genetics, review: 2225
  high-risk groups, susceptibility to viral transformation of cells, review: 2213
  LSD users, review: 2207
  metastases, and blood coagulation, review: 2219
  negative association with hay fever-type allergy or pregnancy sickness: 2461
  occupational, chemists, U.S.: 2245
  paraneoplastic dermatomyositis, case and review: 2471
  specific immunity: 2460
  survival rates, U. S. males: 2455
  with collagen diseases, pathogenesis: 2470
      review: 2226
NERVOUS SYSTEM NEOPLASMS (See also under Brain neoplasms)
  cranial or peripheral nerve tumors, methylnitrosourea-induced, enzyme activity, rat: 2265
  epidemiology, worldwide: 2438
  induction, methylnitrosourea, rat: 2266
NIOBIUM
  trace levels, spontaneous tumor incidence, animal: 2291
NITROGEN OXIDES
  exposure, cancer incidence, Ohio (Cleveland): 2439
4-NITROQUINOLINE-N-OXIDE
  skin tumors, DNA metabolism, mouse: 2287
NITROSAMINE, DIETHYL-
  liver and kidney tumors, swine: 2275
NITROSAMINE, DIMETHYL-
  kidney tumors, classification, rat: 2252
  liver tumors, rabbit: 2274
  mutagenesis, bacterial infection, mouse, method: 2259
NITROSAMINE, METHYL-
  mutagenesis, *Drosophila*: 2261
N-NITROSOGUANIDINE, N-METHYL-N'-NITRO-
  mutagenesis, bacteria (mouse infection) method: 2259
  reaction with DNA, rat liver and intestine: 2256
N-NITROSOHEPTAMETHYLENEIMINE
  lung and g.i. tumors, rat: 2250
N-NITROSOOCTAMETHYLENEIMINE
  lung and g.i. tumors, rat: 2250
N-NITROSOUREA, N-ETHYL-
  effect on immunity, guinea pig: 2307
  teratogenesis and fetal skin carcinogenesis, swine: 2262
N-NITROSOUREA, N-METHYL-
  CNS and peripheral nerve tumors, rat: 2264, 2265,2266
  g.i. tumors, rat: 2266

N-NITROSOUREA, N-METHYL (Contd.)
- leukemia and lymphoma, rat: 2266

NITROSOURETHAN, METHYL-
- mutagenesis, Drosophila: 2261

NUCLEASES
- acid DNase, benzpyrene lung tumors, mouse: 2249
- DNA endonuclease, adenovirus 2- or 12-infected hamster cells: 2423
- DNase and RNase, distribution, Friend leukemia virus-infected mouse spleen: 2401

NUCLEIC ACIDS, DNA
- atmospheric $^{14}CO_2$ effects: 2227
- binding, benzpyrene, microsome-dependent: 2332
  - fluorenylacetamide and derivatives: 2271
- cellular-viral interaction, adenovirus 12-infected hamster cells: 2422
  - polyoma- or SV40-transformed cells, review: 2214
- content, premalignant lesions of cervix: 2457
- distribution, Friend leukemia virus-infected mouse spleen: 2401
- effect of
  - carcinogen, cocarcinogen or non-carcinogenic compound, mouse skin: 2281
  - dimethylbenzanthracene, mouse liver: 2310
  - filtered cigarette smoke, mouse fibroblasts: 2311
- endonuclease, adenovirus 2- or 12-infected hamster cells: 2423
- inhibition by carcinogens, relation to skin tumor initiation, mouse: 2287
- leukemia-like content, WBC, infectious mononucleosis: 2387
- methylation by nitrosoguanidine derivative, rat liver and intestine: 2256
- polyoma virus, reaction with cellular RNA: 2379,2380
- radiation effects, review: 2202
- Rous sarcoma virus-infected chicken or mammalian cells: 2357
- SV40 tumor cells, hamster: 2433
  - viral, actinomycin effects, cell line: 2375

NUCLEIC ACIDS, RNA
- adenovirus-transformed cells: 2371
- atmospheric $^{14}CO_2$ effects: 2227
- avian myeloblastosis virus, aminoacylation: 2395
- binding, fluorenylacetamide and derivatives: 2271
- cellular, reaction with polyoma virus DNA: 2379,2380
- dimethylaminostilbene-induced ear duct tumor, rat: 2299
- distribution, Friend leukemia virus-infected mouse spleen: 2401
- effect of
  - carcinogen, cocarcinogen or non-carcinogenic compound, mouse skin: 2281
  - filtered cigarette smoke, mouse fibroblasts: 2311
  - methylcholanthrene, rat liver: 2315
- leukemia-like content, WBC, infectious mononucleosis: 2387
- polyoma virus-transformed cells: 2371
- rat liver and hepatoma: 2487

NUCLEIC ACIDS, RNA (Contd.)
- Rous sarcoma virus, comparison to host cell DNA: 2357
- SV40-transformed cells: 2371,2372,2433
- synthetic polymer, interferon induction and effect on virus sarcoma, mouse: 2410
- transfer RNA methylase, virus-induced liver tumor, chick: 2437

NUCLEUS
- benzpyrene distribution, normal cells: 2257

OCCUPATIONAL DISEASES
- arsenic exposure, skin cancer: 2329
- cancer incidence, chemists, U.S.: 2245
- leukemia, radiologists, review: 2203
- lung cancer, uranium miners, Czechoslovakia (Jáchymov), smoking: 2231
- silicosis, lung cancer, Switzerland: 2246
- squamous metaplasia of bronchial epithelium, singers or wind instrument players: 2238
- stomach cancer, occupational groups, England + Wales: 2440

OIL MINERAL
- plasma cell tumors, immunosuppression, mouse: 2314
- pulmonary scarring with lung cancer, human: 2247

OIL, PLANT
- citrus oils and components, effect on dibenzpyrene skin tumors, mouse: 2321

OVARY
- dimethylbenzanthracene toxicity, strain differences, mouse: 2284

OVARY CARCINOGENESIS
- dimethylbenzanthracene, fetal mouse: 2263

OVARY NEOPLASMS
- carcinogen-induced, epithelial-mesenchymal interactions, mouse: 2323

PANCREAS NEOPLASMS
- epidemiology, chemists, U.S.: 2245

PARANEOPLASTIC SYNDROMES
- dermatomyositis, case and review: 2471

PARASITIC DISEASES
- schistosomiasis, effect on aminoazotoluene liver carcinogenesis, mouse: 2276
- Trichomonas vaginalis infection, cervix cancer: 2456

PITUITARY NEOPLASMS
- estrogen-induced, chromosomes, male rat: 2304
  - hormonal activity, rat: 2303

PLASMA CELL TUMORS (See under Myeloma and related diseases)

PLASTICS
- mechanism of sarcoma induction, rat, review: 2209

POLYOMA VIRUS (See under Virus, papova)

PREGNANCY
- fetal carcinogenesis, dimethylbenzanthracene, mouse: 2263
  - skin, ethylnitrosourea, swine: 2262
- immune reaction to fetal cells, negative association with cancer: 2461

- PREGNANCY (Contd.)
  - maternal-fetal leukemia virus transmission, mouse: 2337,2338
- PRISTANE (See under Hydrocarbons, aliphatic)
- β-PROPIOLACTONE
  - skin tumors, DNA metabolism, mouse: 2287
- PROPIOPHENONE, p-HYDROXY-
  - effect on m-toluenediamine liver carcinogenesis, rat: 2277
- PROTEINS
  - leukemia-like content, WBC, infectious mononucleosis: 2387
- PYRENE
  - mutagenesis, yeast: 2258

- RADIATION
  - effect on
    - DNA, review: 2202
    - spontaneous leukemia incidence, rat: 2308
  - therapy of larynx sarcoma, subsequent larynx carcinoma: 2232
  - UV, effect on simian adenovirus (SA7) tumorigenicity, hamster: 2418
- RADIATION CARCINOGENESIS
  - atmospheric $^{14}CO_2$, testing method, mouse: 2227
  - lung cancer, uranium miners, Czechoslovakia (Jáchymov), smoking: 2231
  - review (book): 2201
  - skin, human: 2234,2235,2236
  - skull or scalp, human: 2233
  - ^{90}Sr, pituitary-adrenal and thyroid function, rat: 2228
  - sun exposure, skin, human: 2235,2469
  - thorium (Thorotrast), multiple hemangioendothelial sarcoma, human: 2244
- RADIATION LEUKEMOGENESIS
  - chromosomes, radiation chimera, mouse: 2243
  - human, review: 2203
  - ^{32}P, polycythemia vera: 2230
  - role of leukemia viruses and host factors, mouse: 2229
- RADIOACTIVE ISOTOPES AND ELEMENTS
  - atmospheric $^{14}CO_2$, biological testing (mice), apparatus and methods: 2227
  - ^{90}Sr, effect on pituitary-adrenal and thyroid function, rat: 2228
  - thorium (Thorotrast), multiple hemangioendothelial sarcoma, case: 2244
  - tritiated uridine, melanic tumors, Drosophila: 2268
  - uranium, occupational exposure, lung cancer, Czechoslovakia (Jáchymov), smoking: 2231
- RETICULOENDOTHELIAL SYSTEM
  - function, rat with methylcholanthrene sarcoma: 2293

- SCAR TISSUE (See also under Injuries)
  - burns, skin cancer, cases and review: 2204
  - caustic burns and dilatation of esophagus, cancer of esophagus: 2241
  - discoid lupus erythematosus, skin cancer: 2469
  - gastric stump, stomach cancer: 2240
  - lung, scar carcinoma: 2239
- SCAR TISSUE (Contd.)
  - mineral oil fibrosis, lung cancer, human: 2247
- SEX
  - chromosomes, premalignant or malignant cervix or endometrium diseases: 2458
  - difference, fluorenylacetamide bladder or liver carcinogenesis, mouse: 2255
- SILICOSIS
  - lung cancer incidence, Switzerland: 2246
- SKIN
  - abnormalities (ichthyosis), with tongue cancer, child: 2467
  - DNA and RNA, effect of carcinogen, cocarcinogen or non-carcinogenic compound, mouse: 2281
  - hair follicles and sebaceous glands, role in skin carcinogenesis, mouse: 2283
- SKIN CARCINOGENESIS
  - arsenic, occupational: 2329
  - burn scars, mechanism, cases and review: 2204
  - dimethylbenzanthracene
    - carbohydrate metabolism, rat: 2478
    - effect of antitumor agents, mouse: 2286
    - hairless and/or asebic mice: 2283
    - mouse: 2284
    - relation to DNA inhibition, mouse: 2287
    - + vitamin A, hamster cheek pouch: 2285
  - ethylnitrosourea, fetal swine: 2262
  - melanic tumors, tritiated uridine, Drosophila: 2268
  - methylcholanthrene
    - + croton oil, foot appendage, snail: 2267
    - effect of thymectomy, mouse: 2282
  - nitroquinoline-N-oxide, relation to DNA inhibition, mouse: 2287
  - polyoma virus, benign s.c. tumors, rabbit: 2381
  - β-propiolactone, relation to DNA inhibition, mouse: 2287
  - radiation, human: 2233,2234,2235,2236
  - s.c. sarcoma
    - calcium chromate, rat: 2289
    - dibenzpyrene, effect of citrus oils, mouse: 2321
    - dimethylbenzanthracene, immunity, hamster: 2288
    - methylcholanthrene, immunity and RES function, mouse or rat: 2292,2293,2294, 2295,2296,2463
    - polyoma virus + fluorenylacetamide, rat: 2309
  - Shope papilloma virus, spontaneous regression, rat: 2425
  - sun exposure, human: 2235,2469
  - urethan + croton oil, effect of thymectomy, mouse: 2282
    - DNA inhibition, mouse: 2287
- SKIN NEOPLASMS
  - burn scars, cases and review: 2204
  - congenital regressing and maturing neuroblastoma, siblings: 2468
  - discoid lupus erythematosus scar: 2469
  - epidemiology, possible insect transmission of Yaba poxvirus, monkey colony (New York): 2384
  - melanoma, traumatized compound nevus: 2242
  - nevoid basal cell carcinoma syndrome, with benign odontogenic myxoma of jaw: 2466

- SPLEEN
  - effect of polyoma virus, mouse: 2427
  - methylcholanthrene sarcoma, immunity, mouse or rat: 2292,2295
- STATOLON (interferon inducer)
  - effect on Friend leukemia virus infection, mouse: 2399
- STEROIDS, C-21 (See under Hormones)
- STILBENE, 4-DIMETHYLAMINO-
  - ear duct tumors, animal: 2298,2299,2300
- STOMACH NEOPLASMS
  - cell growth rates: 2449
  - epidemiology, England + Wales, socioeconomic and occupational groups: 2440
  - liver metastasis, human, karyotype: 2459
  - postgastrectomy gastric stump: 2240
- SV40 (See under Virus, papova)

- TERATOGENESIS
  - ethylnitrosourea, swine: 2262
  - LSD, human, review: 2207
- TESTIS
  - aflatoxin toxicity, monkey: 2269
- TETRACYCLINE
  - mitochondrial fluorescence, normal, transformed or leukemic human lymphocytes: 2475
- THYMUS
  - methylcholanthrene sarcoma, immunity, mouse: 2294
  - role in urethan + croton oil or methylcholanthrene skin carcinogenesis, mouse: 2282
- THYROID NEOPLASMS
  - human thyrocalcitonin and prostaglandin bioassay, non-infected and SV40-transformed cell culture: 2378
- TIN
  - trace levels, spontaneous tumor incidence, animal: 2291
- TOBACCO SMOKE
  - dispensing apparatus, rabbit: 2248
  - filtered, gas phase, induction of abnormal growth, mouse fibroblasts: 2311
- TOBACCO SMOKING
  - lung cancer, review: 2205
    - uranium miners, Czechoslovakia (Jáchymov): 2231
- m-TOLUENEDIAMINE
  - liver tumors, effect of other carcinogens, rat: 2277
- TOXICITY
  - aflatoxin, liver and testis, monkey: 2269
  - aminoazotoluene, liver, effect of schistosomiasis, mouse: 2276
  - dimethylbenzanthracene, adrenal, animal: 2284, 2313
    - ovary, mouse: 2284
- TRYPTOPHAN METABOLITES
  - hydroxyanthranilic acid, bladder tumors, effect of ascorbate, mouse: 2326
  - xanthurenic acid 8-methyl ether, metabolism, rabbit: 2327
- URETER NEOPLASMS
  - cell growth rates and ploidy: 2451
- URETHAN
  - + croton oil, skin tumors, effect of thymectomy, mouse: 2282
  - leukemia, relationship to immunosuppression, mouse: 2306
    - virus-like particles, mouse: 2305
  - lung and liver tumors, mouse: 2306
  - skin tumors, DNA metabolism, mouse: 2287
- URIDINE
  - tritiated, melanic tumors, *Drosophila*: 2268
- UTERUS (See Corpus uteri)

- VAGINA
  - effect of intrauterine contraceptive device, human: 2237
- VIRAL CARCINOGENESIS
  - review: 2220
  - RNA viruses, mechanism, review: 2211
  - SV40, surface antigens, tumor cells: 2430
  - transformation, cell membrane properties: 2394
    - mechanism, review: 2210
- VIRUS
  - lymphocytic choriomeningitis, localization, method: 2388
  - particles resembling, Novikoff rat hepatoma: 2353
- VIRUS, ADENO-
  - chick embryo lethal orphan (CELO), brain tumors, hamster: 2367
  - human and simian, classification, review: 2212
  - SA7 (simian)
    - brain tumors, hamster: 2366
    - effect of UV, hamster: 2418
    - immunization, SA7-induced tumors, hamster: 2417
    - reaction with adenovirus type 7, monkey cells: 2420
  - type 1, MONT strain (human lymphoma), transformation, rat embryo cells: 2368
  - type 2
    - reaction with SV40, monkey cells: 2424
    - viral DNA endonuclease, hamster cells: 2423
  - type 5, synthesis and morphogenesis of capsid proteins: 2419
  - type 7
    - reaction with SV40 or simian adenovirus (SA-7), monkey cells: 2420
    - SV40 hybrid, surface antigens, transformed marmoset or hamster cells: 2373,2429
  - type 12
    - cellular-viral DNA interaction, hamster cells: 2422
    - infected or transformed cells, effect on benzpyrene tumors, hamster: 2322
    - surface antigens, transformed hamster cells: 2373
    - transformation, host cell RNA, hamster cells: 2371
    - transformed hamster cells, specific nutritive requirement: 2369
    - tumor inhibition by clam extract, hamster: 2421

- VIRUS, ADENO (Contd.)
  - type 12, (Contd.)
    - viral DNA endonuclease, hamster cells: 2423
  - type 31, properties of tumor antigen, hamster tumor: 2370
- VIRUS, HERPES
  - cytomegalovirus, incidence, monkey kidney cells: 2385
  - transformation, surface antigen, hamster cells: 2434
  - simplex, attempted rescue of EB virus, Burkitt lymphoma cells: 2435
- VIRUS, HERPES-TYPE
  - Epstein-Barr (human; Burkitt lymphoma)
    - complement-fixing antigen, leukemia and lymphoma cell lines: 2386
    - infectious mononucleosis: 2387
    - rescue by herpes simplex, Burkitt lymphoma cells: 2435
  - isolation, L_2C/NB guinea pig leukemia: 2436
  - Marek's disease (chicken)
    - associated GA virus, liver tumors, RNA methylase activity, chick: 2437
    - reaction with avian leukosis-sarcoma virus antigens: 2359
- VIRUS, HYBRID
  - adenovirus 7-SV40, surface antigens, transformed marmoset or hamster cells: 2373,2429
- VIRUS, LEUKEMIA/LYMPHOMA
  - avian and mouse, comparison, review: 2212
  - avian myeloblastosis aminoacylation of RNA: 2395
    - hamster tumor: 2354
  - BAI strain A (avian myeloblastosis), group-specific antigens, hamster tumor or immunized chickens: 2359
  - B/T-L (mouse), properties of infected cell lines: 2336
  - 334C (mouse), transmission: 2337,2338
  - Friend (mouse)
    - chemotherapy: 2389
    - effect of
      - interferon inducer (Statolon): 2399
      - polyethylene glycol precipitation: 2345
    - effect on rat tumors: 2346
    - FV 606 strain, self-limited leukemia, host factors: 2340,2341
    - intracellular nuclease and nucleic acid distribution, spleen: 2401
    - production, cell lines: 2343
    - properties of enzyme: 2344
    - spleen focus-forming subunit, nature of sensitive cells: 2342
    - susceptibility, effect of Rich viral lymphoma: 2400
  - Gross (mouse)
    - persistence of infection, tumor cell cultures: 2402
    - thymic lymphoma, pathogenesis: 2403
  - isolation, human leukemia cell line: 2335
  - Japanese quail reticulum cell sarcoma, properties: 2406
  - leukemia viruses, review: 2221
  - Moloney (mouse)
    - antigen and antibody localization, rat: 2348

- VIRUS, LEUKEMIA/LYMPHOMA (Contd.)
  - Moloney (mouse) (Contd.)
    - virus release and cellular antigen level, tumor strains: 2347
  - mouse
    - "host range" variants, strain differences: 2396
    - leukemia viruses, radiation effects and host factors: 2229
    - sarcoma induced by sheep RBC: 2491
    - thymic lymphoma, tumor-specific antigens: 2397
    - urethan-induced leukemia: 2305
  - possible lymphoma virus, spontaneous lymphosarcoma, amphibian (*Xenopus*): 2334
  - radiation leukemia virus (mouse), thymic lymphoma, tumor-specific antigens: 2397
  - Rauscher (mouse)
    - comparison with heterotransplanted human or canine leukemia, mouse: 2405
    - enhancement of Moloney sarcoma virus tumor induction: 2350
    - host resistance, effect of interferon, mouse: 2339
    - immunosuppression, spleen cell implants *in vivo* (mouse): 2404
  - Rich lymphoma (mouse), susceptibility to Friend leukemia virus: 2400
- VIRUS, MAMMARY TUMOR
  - mouse
    - detection of antibodies, method: 2364
    - immunization: 2362
    - immunoassay of viral antigen: 2361
    - liver extract-induced tumor regression: 2365
    - mouse, transformation of hyperplastic mammary nodules, pituitary hormone effects: 2363
  - particles resembling, mouse brain tumor (ependymoblastoma): 2416
- VIRUS, PAPOVA- (papilloma-polyoma-vacuolating)
  - classification, review: 2212
  - polyoma
    - and acetylaminofluorene, liver, kidney and s.c. tumors, rat: 2309
    - antilymphocyte serum-induced resistance, mouse: 2428
    - chromosome abnormalities, transformed cell line: 2492
    - DNA binding to cellular RNA: 2379
      - interaction with transformed cell DNA, review: 2214
    - effect on spleen, mouse: 2427
    - gene activity, infected or transformed cells: 2380
    - kidney sarcoma, rat: 2382
    - and Rous virus, double transformation, hamster cells: 2390
    - s.c. and brain tumors, rabbit: 2381
    - thymidine kinase-deficient cell line: 2376
    - transformation
      - host cell RNA, hamster cells: 2371
      - reversion, hamster cells: 2377
      - surface antigens and membrane properties, mouse or hamster cells: 2373,2426, 2434
  - Shope papilloma (rabbit), spontaneous regression of rat tumors: 2425

VIRUS, PAPOVA (papilloma-polyoma-vacuolating) (Contd.)
- SV40
  - actinomycin effect on DNA, cell line: 2375
  - adenovirus 7 hybrid, surface antigens, transformed marmoset or hamster cells: 2373,2429
  - antigen composition and virus-specific-RNA, transformed cells: 2372
  - cross-immunity to dimethylbenzanthracene sarcoma, hamster: 2288
  - hamster tumor (F-5), effect of nucleic acids *in vitro*: 2433
  - induction, mechanism, transformed cells: 2392
  - lens tumors, hamster: 2383
  - plaque mutants, immunochemical assay: 2374
  - reaction with adenovirus type 2, monkey cells: 2424
    - adenovirus type 7, monkey cells: 2420
  - transformation
    - cell-virus DNA interaction, review: 2214
    - host cell RNA, hamster cells: 2371
    - human amnion cells, classification: 2431
      - virus production: 2432
    - surface antigens and membrane properties, rodent or human cells: 2373,2426,2430
    - susceptibility, and cancer risk, review: 2213
    - thyrocalcitonin and prostaglandin synthesis, human thyroid cancer culture: 2378

VIRUS, POX
- Yaba histiocytoma, transmission, insect vectors, monkey colony (New York): 2384

VIRUS, SARCOMA
- avian
  - comparison to mouse sarcoma viruses, review: 2212
  - mechanism of action, review: 2211
- Claude's chicken tumor-10, tumor pathology: 2360
- Finkel osteosarcoma (mouse), transformation, rat embryo cells: 2409
- Friend (mouse), effect of interferon induction: 2410
- hamster, attempted isolation, reticulum cell sarcoma: 2408
- Harvey (mouse)
  - immunization: 2352
  - mechanism of action: 2407
- human osteosarcoma, tumor induction, hamster: 2391

VIRUS, SARCOMA (Contd.)
  - serum antibodies: 2393
- Moloney (mouse)
  - distribution, mouse: 2411
  - effect of interferon, normal cells: 2351, 2410
  - enhancement by Rauscher leukemia virus or rabbit antisera: 2350
  - mechanism of action: 2407
  - rat or mouse virus, tumor induction in hamster: 2349
- mouse, comparison to avian sarcoma viruses, review: 2212
- Rous (chicken)
  - acid mucopolysaccharide production, transformed mammalian or chicken cells: 2358
  - comparison of viral RNA to host cell DNA: 2357
  - group-specific antigens, immunized chickens or hamster tumors: 2359
  - hamster tumor, mitochondria-associated viral particles: 2355
  - and polyoma virus, double transformation, hamster cells: 2390
  - sarcoma with leukemoid reaction, germfree rat: 2412
  - transformation
    - marmoset kidney cells: 2414
    - rat embryo cell line: 2356
    - virus-specific antigens, hamster cells: 2415
  - unmasking, monkey tumor: 2413

VITAMIN A
- cocarcinogenesis with dimethylbenzanthracene, hamster cheek pouch: 2285

WATER
- marine phytoplankton, benzpyrene synthesis *in vitro*: 2333

XANTHURENIC ACID 8-METHYL ETHER (tryptophan metabolite)
- metabolism, rabbit: 2327

ZIRCONIUM
- trace levels, spontaneous tumor incidence, animal: 2291

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

Vet. Med

NOVEMBER 1969
Abstract Nos. 2493-2727

[illegible]
JAN 1 [illegible] 1970
[illegible]

Vol. 7
No. 11

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

CARCINOGENESIS ABSTRACTS

Volume 7, Number 11
November, 1969

Abstract Numbers
2493-2727

THE LIBRARY OF THE
JAN 16 1970
UNIVERSITY OF ILLINOIS

CONTENTS

	Page
Review	469
Physical Carcinogenesis	472
Chemical Carcinogenesis	475
Viral Carcinogenesis	486
Epidemiology and Biometry	494
Miscellaneous	505
Author Index	i
Subject Index	iv

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

[illegible] OF [illegible] [illegible] [illegible]

[illegible] by [illegible]

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a national program of cooperative research in cancer, is establishing a means whereby information in the field of carcinogenesis will be coordinated and made available. The information to be included will be obtained from the National Cancer Institute, other governmental agencies, and non-governmental research institutions.

The issuing of *Carcinogenesis Abstracts* under the auspices of the National Cancer Institute will provide a central source for current abstracting of the carcinogenesis literature being published throughout the world. This will help facilitate an integrated and cooperative program of investigation in this area. The growing number of publications in the area of carcinogenesis makes imperative the availability of an appropriate abstracting service so that investigators may be apprised of progress with a minimum of delay. It is our desire to provide the investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most recently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus* If the journal is not covered by *Index Medicus*, then the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

admin.	administered, administration	mg	milligram(s)
av.	average	min.	minute(s)
C	curie(s)	ml	milliliter(s)
mC	millicurie(s)	mm	millimeter(s)
μC	microcurie(s)	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
conc.	concentration	NIH	National Institutes of Health, USA
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	QO_2	oxygen quotient
DNase	deoxyribonuclease	PFU	plaque forming unit
e.g.	for example	ppm	parts per million
FFU	focus forming unit	pt.(s)	patient(s)
g.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
g	gram(s)	RES	reticuloendothelial system
μg	microgram(s)	resp.	respectively
Hb	hemoglobin	RNA	ribonucleic acid
i.a.	intra-arterial	RNase	ribonuclease
ID_{50}	median infectious dose	soln.	solution
inj.	injected, injection(s)	s.c.	subcutaneous
inoc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
i.p.	intraperitoneal	x	times (e.g. x 3/wk.)
I.U.	international unit(s)	U	unit
i.v.	intravenous	UV	ultraviolet
kg	kilogram(s)	vol.	volume
LD_{50}	median lethal dose	VA	Veterans Administration
M	molar, mole(s)	wt.	weight
mM	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
μM	micromole(s)		
max.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

Af.	Afrikaans	E.	English	Hun.	Hungarian	Lith	Lithuanian	Ser.	Serbo-Croatian
Ar.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
Bul.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
Ch.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
Cz.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
Dan.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
Dut.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

69-2493 BIOLOGY AND CYTOLOGY OF LUNG CANCER. (Sp.) Sirtori, C. (Gaslini Inst., Genoa, Italy). Acta Ginec. (Madr.) 20(1):37-52, 1968. (78 references)

Possible roles of radiation exposure, chemicals (smoking, air pollution, chromium, nickel, asbestos, etc.), viruses, pre-existing conditions (vitamin A deficiency, pulmonary scars, benzpyrene hydroxylase deficiency, etc.), genetic factors and psychological stress on the etiology of lung cancer in man are discussed.

69-2494 ACHALASIA AND CARCINOMA OF THE ESOPHAGUS. (E.) Just-Viera, J. O. and C. Haight (U. Michigan Sch. Med., Ann Arbor). Surg. Gynec. Obstet. 128(5):1081-1095, 1969. (127 references)

A survey of the American and Western European literature since 1872 disclosed 167 cases of cancer of the esophagus (usually squamous cell carcinoma) associated with achalasia. For a variety of reasons, the reported frequency of cancer in pts. with achalasia varied from 0% in some studies to 20% in others; in the authors' pt. group it was 3%. In contrast to the prevalence of female pts. with achalasia, cancer associated with achalasia was more prevalent in males than in females. Very few of these pts. were Negro. Cancer tended to develop at an earlier age in the presence of achalasia than in the normal esophagus; av. ages were 48 and 62 yr., resp. Many pts. with achalasia and cancer were under 40; the youngest was 14 yr. old. In the authors' series, achalasia or its symptoms had been present for an av. of 17 yr. before cancer was found. The roles of esophageal stenosis, injuries, chronic irritation, esophagitis, papillomas and ulcers, chronic inflammatory processes and other factors in the etiology of esophageal cancer in pts. with achalasia are discussed.

69-2495 THE EPIDEMIOLOGY OF LUNG CANCER AMONG URANIUM MINERS. (E.) Donaldson, A. W. (Health Serv. & Mental Health Admin., Washington, D. C.). Health Phys. 16(5):563-569, 1969. (17 references)

The relationships between prolonged underground exposure to radon daughter products and excess lung cancer mortality rates in white uranium miners (not in non-white miners) in the U.S. are discussed, on the basis of several previously published studies. Other studies relating to lung cancer in uranium miners in Europe (Schneeberg and Joachimsthal) and fluorspar miners in Newfoundland are also mentioned.

69-2496 COMBINED ACTION OF CHEMICAL CARCINOGENS AND IONIZING RADIATIONS. (Rus.) Kondrat'eva, A. F. (Sci. Res. Inst. Oncol., Acad. Med. Sci. USSR, Moscow). Vop. Onkol. 15(3):109-118, 1969. (95 references)

A literature review covering the period 1924-1966 is presented. Combined admin. of irradiation and chemical carcinogens usually increases the incidence of cancer, even at very low irradiation doses (20 r). Radiation doses which are lethal to cells, however, can decrease the tumor incidence.

69-2497 YAMAGIWA'S TAR CANCER AND ITS HISTORICAL SIGNIFICANCE: FROM YAMAGIWA TO KENNAWAY. (E.) Shear, M. J. (NCI, Bethesda, Md.). Gann 60(2):121-127, 1969. (No references)

The history of research in chemical carcinogenesis is reviewed, with particular reference to studies by Japanese scientists.

69-2498 CHEMICAL STRUCTURES AND PATHOLOGICAL EFFECTS OF PYRROLIZIDINE ALKALOIDS. (E.) Schoental, R. (Med. Res. Coun. Lab., Carshalton, England). Israel J. Med. Sci. 4(6):1133-1145, 1968. (50 references)

The chemical structures and toxic effects of many pyrrolizidine alkaloids (including those derived from plants) presently used for food or medicinal purposes) are discussed, with emphasis on compounds inducing tumors of the liver and possibly other organs.

69-2499 A SUBCELLULAR AGENT INDUCING PLASMA CELL LEUKEMIAS IN MICE. THE RELATION OF THIS AGENT TO AMYLOIDOSIS AND CHRONIC MURINE PNEUMONIA. (E.) Ebbesen, P. (U. Copenhagen). Danish Med. Bull. 16(4):105-108, 1969. (35 references)

The current status of research on this amyloidogenic and leukemogenic agent (apparently unrelated to the agent causing chronic pneumonia in mice) is reviewed, with particular reference to the author's previously published reports. (See also CRA 7(3):#573, March 1969; and CRA 7(8):#1672, August 1969.)

69-2500 TUMORS OF THE ORAL CAVITY IN CHILDHOOD. (Ger.) Seifert, G. (U. Hamburg, Germany). Z. Kinderchir. Supp.6:77-103, 1969. (171 references)

The frequencies of various tumors of the oral cavity in childhood (including sex ratios and changes in the frequency with age) are discussed. Tumors of the oral cavity comprise less than 5% of all tumors in childhood, compared to 10% in adults.

69-2501 BIOLOGY OF STOMACH CANCER. (It.) Sirtori, C. Gazz. Sanitaria 39(9): 446-448, 1968. (44 references)

Contributory factors in the etiology of stomach cancer include loss of teeth, vitamin deficiencies (particularly of vitamins A, C, or B_{12}), diets rich in spicy, salty, very hot or fried foods, air pollution, drinking too much wine and/or too little milk, and hereditary factors (blood group A). It is suggested that a return to the Greco-Roman custom of eating while reclining on the left side would facilitate digestion (by preventing the gastric juice from coming too close to the pylorus and inhibiting the production of gastrin), and might prevent the development of gastritis and other diseases predisposing to stomach cancer.

69-2502 PRIMARY MALIGNANT TUMORS OF THE LIVER IN CHILDREN. (Ger.) Graser, F. (City Child. Clin., Wiesbaden, Germany). Z. Kinderchir. Suppl. 6:270-275, 1969. (22 references)

In an attempt to account for the much higher relative frequency of primary malignant liver tumors in children under 2 than in older children, the possible roles of prenatal and/or neonatal exposure to liver carcinogens are discussed, though no conclusions could be drawn.

69-2503 LEUKEMIA IN THE AGED. (It.) Polli, E. (U. Milan, Italy). G. Geront. 16(10):1103-1118, 1968. (18 references)

The progressive worldwide increase in the frequency of leukemia since 1940 is second only to the increase in coronary thrombosis and lung cancer. Leukemia primarily affects young children and adults over 50. The frequency of all leukemias in persons over 60 is presently 50-70% of the frequency in the population as a whole (depending on the type of leukemia); however, 70-80% of all pts. with chronic lymphatic leukemia are now in the 40-70 yr. age group; approx. 80% of all acute leukemias seen in pts. over 60 are of the myelomonocytic type.

69-2504 ETIOLOGY AND PREVENTION OF ENDOMETRIAL CANCER. (Ger.) Kaiser, R. (1st U. Gynec. Clin., Munich, Germany). Geburtsh. Frauenheilk. 29(5):431-440, 1969. (54 references)

Anovulatory menstrual dysfunction, nulliparity or infrequent parity may predispose susceptible women to cellular changes favoring the development of endometrial cancer, because of a reduction or absence of progresterone-induced periods of proliferative rest of the endometrium.

69-2505 ORAL ANTICONCEPTION. SIDE EFFECTS AND RISKS. (E.) Østergaard, E. Acta Obstet. Gynec. Scand. 48(Suppl. 1):57-72, 1969. (27 references)

Nine oral contraceptives, containing 7 different combinations of synthetic estrogens (E) and synthetic progestational hormones (PH), have been approved by the National Health Service of Denmark. The use of combination contraceptives (not sequentially admin. agents, which are still being tested) was approved in 1956, after several clinical trials. At present, 150,000-200,000 Danish women are taking these E + PH combinations. Three of these combinations (4 preparations) are PH-dominated and 2 combinations (3 preparations) are E-dominated; in the other 2 combinations, the balance between E and PH is about equal. No new cases of cancer of the breast or genital organs, attributable to the E + PH combinations, have been reported. In fact, suspicious lesions, dysplasia and carcinoma in situ in these women are less frequent than the expected rates. It is suggested that the PH (with its antiestrogenic and antimitotic effect) might prevent the development of cancer.

69-2506 DIAGNOSTIC PROBLEMS IN EARLY RECOGNITION. I. (Ger.) Naujoks, H. (Gynec. U. Frankfurt am Main, Germany). Gynakologe 1(4):166-173, 1969. (36 references)

A review of methods and procedures in the early diagnosis of cancer of the cervix, concluding that early reports which suggested a possible association between drug-induced inhibition of ovulation and premalignant or malignant epithelial changes have not been substantiated. Although the changes which sometimes occur suggest leukoplakia in some ways, they differ from leukoplakia, incipient carcinoma in situ, and known forerunners of carcinoma in situ in a number of important respects, including the absence of actual epithelial hypertrophy and/or any increase in the number of true matrix areas.

69-2507 CARCINOMA OF THE CERVIX. (Ger.) Hillemanns, H. G. (Gynec. Clin., U. Freiburg/Br., Germany). Gynakologe 1(4): 150-166, 1969. (126 references)

The epidemiology, etiology, pathogenesis, classification and morphogenesis of cervix cancer are discussed.

69-2508 ALTERATIONS IN CHROMOSOMES AND DNA CONTENT IN GYNECOLOGIC NEOPLASMS. (E.) Richart, R. M. (630 W. 168th St., New York, N. Y.) and A. S. Ludwig. Amer. J. Obstet. Gynec. 104(4):463-471, 1969. (53 references)

Available evidence concerning the cytogenetic abnormalities present in carcinoma of the cervix, adenocarcinoma of the endometrium, teratomas of the ovary and testis, trophoblastic tumors, and tumors developing in dysgenetic gonads is discussed. Cytogenetic examination is recommended for the identification of preneoplastic lesions and tumors of different degrees of clinical malignancy.

69-2509 THE XO/XY SEX CHROMOSOME MOSAIC. (Ger.) Nars, P. W. (Pediat. Clin., U. Basel, Switzerland) and E. M. Bühler. Humangenetik 7(3):185-196, 1969. (51 references)

Data on 43 cases of XO/XY mosaicism reported in the literature and 1 case seen by the authors are discussed. In persons with XO/XY mosaicism and a female or male phenotype, the chances of developing a gonadal tumor (either a seminoma or a gonocytoma) are estimated at 1 in 6 and 1 in 9, resp.

69-2510 THE RELATIONSHIP BETWEEN AGEING AND CANCER: SOMATIC MUTATIONS OR BREAKDOWN OF HOST DEFENCE MECHANISMS. (E.) Alexander, P. (Chester Beatty Res. Inst., Sutton, Surrey, England). Bull. Schweiz. Akad. Med. Wiss. 24(4):258-271, 1969. (50 references)

A discussion of available evidence (with particular reference to studies of the effects of radiation and chemical mutagens in mice) concludes that the transformation of a normal cell into a malignant cell is a somatic mutation, but that the rate-determining process in carcinogenesis may be the elimination of the host's immune mechanism which normally destroys such transformed cells. Age-associated physiological changes, in several indirect ways, may facilitate this "escape" of the malignant cells.

69-2511 GENESIS OF EMBRYONAL TUMORS. (Ger.) Müntener, M. (U. Zurich, Switzerland) and G. Töndury. Z. Kinderchir. Suppl. 6:11-29, 1969. (113 references)

It is suggested that the development of embryonal tumors (teratomas, nephroblastomas, hepatoblastomas, neuroblastomas, medulloblastomas, retinoblastomas and diktyomas) is by no means limited to the embryonic period, but continues to be possible as long as the tissue involved is still in an immature or developmental state. Although genetic factors probably play a role, at least in some cases, disturbances of development and maturation (especially those resulting from exogenous factors such as irradiation and exposure to chemicals) also appear to play a very considerable role.

69-2512 POLYPOSIS AND CANCER OF THE LARGE INTESTINE. (It.) Marcozzi, G. (U. Rome, Italy). Aggiorn. Clinicoter. 10(2): 1-73, 1969. (82 references)

The incidence, etiology and pathology of these 2 diseases are compared. It is concluded that an adenomatous polyp can degenerate into an actively malignant tumor, but does not necessarily do so. Malignant transformation always begins in the apical region of a polyp, and may be either unicentric or multicentric. Familial types of intestinal polyposis associated with tumors (the Peutz-Jeghers, Gardner, Oldfield and Turcot syndromes) are also briefly discussed.

69-2513 CHROMOSOMAL ABNORMALITIES IN CERTAIN HUMAN MALIGNANCIES. A REVIEW. (E.) Gottlieb, S. K. (NCI, Bethesda, Md.). J.A.M.A. 209(7):1063-1066, 1969. (18 references)

Chromosomal abnormalities associated with chronic or (sometimes) acute myeloid leukemia (Philadelphia chromosome), chronic lymphocytic leukemia (Christchurch chromosome), some malignant lymphomas (Melbourne chromosome), nonepithelial tumors (Madison chromosome), testicular tumors (a long marker) and certain tumors in children (double minute chromatin bodies) are discussed. It is suggested that although the presence of such chromosomal abnormalities can be of diagnostic, therapeutic or prognostic value, these changes may not be essential for either the initiation or maintenance of a malignant tumor, and may in fact be only secondary to some other primary change(s).

69-2514 THE ROLE OF VIRUSES IN CANCER. (E.) Clark, R. L. (U. Texas M.D. Anderson Hosp. Tumor Inst., Houston) and L. Dmochowski. Arq. Pat. (Lisboa) 40(1):3-9, 1968. (4 references)

See also abstract no.: 2694

69-2515 NEOPLASIA IN NONHUMAN PRIMATES. (E.) Chapman, W. L., Jr. (U. Georgia, Athens). *J. Amer. Vet. Med. Ass.* 153(7):872-878, 1968.

Four tumors in adult monkeys (about 5-15 yr. old) are described. In 2 males (*Macaca nemastrina* or *M. mulatta*) with fibromas and 1 female (*M. mulatta*) with a lipoma, the tumors were apparently spontaneous. In 1 female *M. mulatta* (9 yr. old) with a mammary tumor (papillary duct carcinoma with axillary lymph node metastases), the tumor had developed 1 yr. after the completion of a course of total-body irradiation (2000 r over about 3 yr.).

69-2516 FIBROSARCOMAS DEVELOPING IN SCAR-TISSUE. (E.) Kanaar, P. (U. Hosp., Leiden, Netherlands) and J. Oort. *Dermatologica (Basel)* 138(4):312-319, 1969.

Although primary sarcomas of the skin are rare (5-6% of all sarcomas), and most are of the reticulum cell or dermatofibrosarcoma protruberans type, the authors encountered 3 female pts. with fibrosarcomas involving scar tissue, within a short period of time. In 1/3 (age 62 yr.), a mixed tumor (adjacent areas of spinocellular carcinoma and poorly differentiated fibrosarcoma) was removed from an area of marked scarring and atrophy of the skin, which had resulted from deep radiotherapy (radium) 28 yr. previously for a nevus flammeus of the face. One pt. (age 33 yr.), apparently with a slight degree of xeroderma pigmentosum, had developed the first of many skin tumors (basal cell and spinocellular carcinomas, premalignant keratosis and, later, premalignant melanosis) 20 yr. previously, and had received many courses of soft X-rays in moderate doses (unspecified) since that time. After a highly differentiated fibrosarcoma involving 1 area of facial scar tissue was identified, preceding biopsy specimens were reviewed, but no evidence of malignant connective tissue proliferation was found. The third pt. (age 45 yr.) had a disease process of unknown nature, characterized by the repeated formation of scar-like skin nodules (lumbosacral area), which showed a closer resemblance to keloids with each successive examination. About 7 yr. after the first nodule was removed, a recurrent nodule was identified as a poorly differentiated fibrosarcoma. This pt. had not received radiotherapy. It was not possible to identify the time of malignant transformation of the scar tissue in the last 2 pts.

69-2517 CHANGES IN THE ENZYME LEVELS OF MOUSE ORGANS AFTER LEUKEMOGENIC DOSES OF X-RAY AND TREATMENT WITH RADIATION LEUKEMIA PROTECTION FACTOR. (E.) Yip, L. C. (Indiana U. Med. Ctr., Indianapolis), N. Blair, P. L. Yu and M. E. Hodes. *Israel J. Med. Sci.* 4(6): 1188-1194, 1968.

In 4-5-wk.-old random-bred female Swiss mice, exposure to lymphosarcoma-inducing doses of whole-body X-rays (1 dose/wk. of 180 r for up to 4 wk.) caused increases in the activities of alkaline phosphatase (AP) and lactate dehydrogenase (LDH) in the serum and liver, and in the activities of AP, LDH and DNase-II in the spleen, within 1-3 days after each radiation exposure. When substances with radiation leukemia-protective (RLP) activity were admin. within 1 hr. after each radiation exposure, the reductions of hepatic LDH and AP activity observed 7 days later were correlated to the RLP activities of the substances admin. This method is proposed as a rapid assay for RLP activity.

69-2518 A QUANTITATIVE STUDY OF THE LEUKEMOGENIC ACTION OF WHOLE-BODY X-IRRADIATION AND URETHANE. I. IN ADULT C57BL MICE. (E.) Berenblum, I. (Weizmann Inst. Sci., Rehovoth, Israel), L. Chen and N. Trainin. *Israel J. Med. Sci.* 4(6):1159-1163, 1968.

In C57BL mice, background leukemogenesis with single doses of whole-body X-irradiation alone (50-400 r) was almost as low as the spontaneous incidence of leukemia. When X-irradiation was combined with up to 10 inj. of urethan (1 mg/g; 1 inj./wk.), the leukemia incidence was higher when urethan inj. preceded irradiation than when the irradiation was admin. first. With combined treatment, leukemogenesis was greatest with 5 inj. of urethan; the leukemia incidence also increased with increasing dose of irradiation. Younger mice (28-32 days old) were more susceptible than older mice (37-44 days old).

69-2519 A QUANTITATIVE STUDY OF THE LEUKEMOGENIC ACTION OF WHOLE-BODY X-IRRADIATION AND URETHANE. II. IN NEWBORN C57BL MICE. (E.) Chen, L. (Weizmann Inst. Sci., Rehovoth, Israel) and I. Berenblum. *Israel J. Med. Sci.* 4(6):1164-1168, 1968.

No leukemogenic response was observed to single or multiple doses of whole-body X-irradiation (50 r) in newborn or suckling C57BL mice. Multiple doses of 150 r induced leukemia, but this response was no greater than that seen in adults. Newborn mice showed a high incidence of leukemia in response to inj. of urethan (1 mg/g) but adult mice did not. In newborn mice, a single inj. of urethan had no effect, but 2-3 inj. (1 inj./wk.), begun within 4 days after birth, induced leukemia; a larger number of urethan doses did not increase the leukemia incidence. Adult mice were apparently able to catabolize urethan, which seemed to persist unchanged in newborn mice.

9-2520 PRESENCE OF A PARTICULAR MODALITY OF LIGHT REFLECTION IN THE SKIN OF ATIENTS WITH EPITHELIOMA OF THE SKIN. (Rum.) ălus, L. (Dermato-Venerol. Ctr., M.S.P. Hosp., uchărest), A. Cirures, E. Harap and D. ernicanu. Oncol. Radiol. 7(3):243-248, 1968.

he reflection of incident, monochromatic light wavelengths 480-578 mμ) from normally light-xposed skin (forehead) and normally non-exposed kin (buttocks) was studied in 53 pts. with 1 or ore skin carcinomas (involving only the face) nd 40 pts. with other skin diseases (controls). he site of the reflected light did not affect he results. The coefficients of reflection in he cancer pts. were significantly higher than n the controls (1.610 and 1.365, resp.), This efective absorption of sunlight in the cancer ts. was attributed to the existence of some nknown morphopathological changes in the skin, elated to an oncogenic predisposition.

9-2521 HISTORY OF THE EXPOSURE OF MINERS TO RADON. (E.) Holaday, D. A. (Nat. tr. Urban Indust. Health, Cincinnati, Ohio). ealth Phys. 16(5):547-552, 1969.

he cause-effect relationship between exposure o radon daughters (RD) and lung cancer was not roved until about 5 yr. ago, but the high lung ancer death rates in uranium miners in chneeburg (Germany) and Joachimsthal (Czecho-lovakia) were first reported in 1879 and 1926, esp. The unexpectedly high lung cancer death ate in Newfoundland fluorspar miners (1952-1960) as traced to RD contamination of ground water. D exposure was suspected but not proved in a roup of American miners exposed to a variety of nvironmental factors (silica dust, a wide ariety of minerals, cigarette smoke, etc.) but ot to radioactive ores or diesel exhaust fumes rom underground engines. In 1950, about 500 merican miners were producing about 600 tons/day f uranium ore; 9 lung cancer deaths were ecorded in American uranium miners by December, 960. A new definition of the working level WL) unit of RD exposure was proposed in 1955: 0^{-10} C/liter of ^{222}Rn in equilibrium with RD the older definition was: any mixture of RaA, aB, RaC and RaC' in 1 liter of air, which eleases 1.3 x 10^5 million electron volts of lpha energy in decaying to RaD). Efforts made ince about 1950 to control atmospheric RD evels in U.S. uranium mines are presented. In 952, about 44% showed atmospheric RD levels bove 10 WL; by 1967, RD levels were below 1 WL n 70% of 217 mines, and over 10 WL in only 1%. robable ranges of RD conc. that existed in the uropean mines (Schneeburg and Joachimsthal) re 10-180 WL, compared to 2-200 WL in U.S. ranium mines, 2.5-10 WL in the Newfoundland luorspar mines, and 0.5-10 WL in U.S. metal ines.

69-2522 MORTALITY OF URANIUM MINERS IN RELATION TO RADIATION EXPOSURE, HARD-ROCK MINING AND CIGARETTE SMOKING--1950 THROUGH SEPTEMBER 1967. (E.) Lundin, F. E., Jr. (NIH, Bethesda, Md.), W. Lloyd, E. M. Smith, V. E. Archer and D. A. Holaday. Health Phys. 16(5):571-578, 1969.

A follow-up study (1950-September, 1967) of 3414 white underground uranium miners disclosed 398 deaths; the expected number of deaths in the male population of the region studied (Colorado, Utah, Arizona and New Mexico) was 251.08. This significant excess in the miners was largely accounted for by excess violent deaths and deaths from respiratory cancer; the observed/expected (O/E) rates were 120/50.52 and 62/10.02, resp. The O/E values for respiratory cancer deaths were in significant excess in miners exposed to uranium for 10 yr. or more (48/5.41) or for 5-9 yr. (12/3.24), but not for miners exposed for up to 5 yr. (2/1.41). Significant excesses in respiratory cancer were seen at all levels of estimated exposure to radon daughters, including the 2 lowest dosage levels. Excesses of respiratory cancer deaths/10,000 person-yr. of observation in the white miners were 1.7 in non-smokers and 17 in cigarette smokers. In 761 non-white uranium miners (mostly Indians) followed up during the same period, a significant deficit in total deaths was observed (O/E of 59/79.11). This resulted from deficits in deaths by violence and deaths from cardiovascular-renal disease. The previously noted significant deficit in cancer deaths in these non-white miners had disappeared by the end of this study period, however; O/E rates for deaths from g.i. cancer, respiratory cancer, and all other cancers were 1/2.72, 2/1.34 and 2/2.93, resp. The disappearance of the respiratory cancer deficit was attributed to the effects of cigarette smoking; 18% of the person-yr. of observation, and 1/2 of the respiratory cancer deaths in the non-white miners, were contributed by smokers.

69-2523 THE DILEMMA OF LUNG DOSIMETRY. (E.) Parker, H. M. (Pacific Northwest Lab., Richland, Wash.). Health Phys. 16(5):553-561, 1969.

The problems of ascertaining the reliability of models that relate exposure to an atmosphere containing radon and its daughter products, to the relevant absorbed dose in the lung, are discussed. Principal weaknesses of these models include the uncertain composition of the inhaled aerosol, the measurements of deposition and translocation in the lungs, and uncertainties in determining the geometry of alpha emitter penetration into biological target (presumably the basal cell nuclei in the bronchial epithelium). It is concluded that the absorbed dose to the nuclei of basal cells in the small bronchi is 7 rad/WLM (working-level-mo.), which may be low or high within a factor of 3. This is not a demonstrated dose-effect relationship.

69-2524 BLOOD AND SKELETAL LEVELS OF ^{210}Pb-^{210}Po AS A MEASURE OF EXPOSURE TO INHALED RADON DAUGHTER PRODUCTS. (E.) Blanchard, R. L. (Box 8137 Salt Lake City, Utah), V. E. Archer and G. Saccomanno. Health Phys. 16(5):585-596, 1969.

Autopsy specimens of the ribs and vertebrae, obtained from 22 uranium miners (including 19 who died of lung cancer) showed a ^{210}Pb conc. of 0.124-19.0 μμC/g and a ^{210}Po conc. of 0.209-5.86 μμC/g. These levels of radon (^{222}Rn) daughter products were compared to ^{222}Rn daughter exposure, with corrections for the excretion of ^{210}Pb from the skeleton during the time of exposure (to the termination of mining and to death). The log of the ^{210}Pb conc. in bone was significantly correlated with the log of the miners' cumulative experience (adjusted for ^{210}Pb excretion). Three possible explanations which might account for the more rapid increase in ^{210}Pb bone conc. observed (relative to radon daughter exposure) are discussed. Conc. of ^{210}Pb in blood samples (also taken at autopsy) were 6.6-158 μμC/g and showed a linear correlation to the conc. in bone samples. The possibility of using blood ^{210}Pb levels as an estimate of cumulative occupational exposure is suggested.

69-2525 A MODEL FOR ESTIMATING THE INHALATION EXPOSURE TO RADON-222 AND DAUGHTER PRODUCTS FROM THE ACCUMULATED LEAD-210 BODY BURDEN. (E.) Fisher, H. L., Jr. (Nat. Ctr. Radiol. Health, Rockville, Md.). Health Phys. 16(5):597-616, 1969.

An 8-compartment model (based on ^{210}Pb retention in dogs) for estimating the inhalation exposure to ^{222}Rn and its daughter products from the accumulated ^{210}Pb retention (body burden) was applied to the estimated working level exposures of 32 uranium miners. A computer program was written concerning the least squares fitting of any retention function to any specified exposure/intake. Five retention functions were fit to the data and the ^{210}Pb body burden was estimated to within a factor of 2 or 4, with corresponding confidence levels of 68% and 95%, resp.

69-2526 SARCOMA OCCURRING IN A LUPUS VULGARIS SCAR. (E.) Benjamin, E. S. (Groote Schuur Hosp., Capetown, S. Africa) and W. Gordon. Dermatologica (Basel) 138(4):284-287, 1969.

A 72-yr.-old women with facial lupus vulgaris of about 20 yr. duration was successfully treated with tuberculostatic drugs (admin. for 2 yr.), but received no radiotherapy. About 6 yr. after the diagnosis of lupus a tumor developed on the lupus scar, and was identified as a spindle cell sarcoma.

See also abstract nos.: 2494,2495,2496,2510,2690,2705

-2527 COCARCINOGENIC AGENTS DERIVED FROM *Euphorbiaceae*. (Ger.) Hecker, E. erman Cancer Res. Ctr., Heidelberg, Germany). *anta Med*. Supp. to 1968:24-45, 1968.

tex samples from many plants of the widespread mily *Euphorbiaceae* contain toxic, inflammatory d cocarcinogenic (mouse skin) substances. e croton oil fractions from these plants show hydrophilic fraction containing the biologically tive phorbol-(12,13)-diesters, and a hydro- obic fraction containing biologically inactive orbol-(12,13,20)-triesters. A latex sample om *Euphorbia lathyris* or *E. ingens* showed xic and cocarcinogenic activity, which was aceable to a palmitic acid ester of a poly- nctional diterpene.

-2528 DETERMINATION OF TAR HYDROCARBONS IN THE AIR. IV. DETERMINATION OF 3,4- NZFLUORANTHENE. (Cz.) Malý, E. (Med. Fac., rajevo, Yugoslavia), B. Simić and G. Krajtmajer. *acov. Lek*. 21(1):14-18, 1969.

gh-temperature tar paper chromatography was ed to separate 3,4-benzfluoranthene (3,4-BF) om air samples. The R_F value for 3,4-BF was gher than that for 3,4-benzpyrene. Calibrated rves for 3,4-BF and 11,12-benzfluoranthene 1,12-BF) showed almost identical R_F values, t the 2 compounds showed blue-green and violet luorescence, resp. The chromatographic roperties of mixtures of 3,4-BF and 11,12-BF re also discussed.

9-2529 CYTOGENETIC EFFECTS OF 3-HYDROXY-KYNURENINE AND 3-HYDROXYANTHRANILIC CID ON HUMAN EMBRYONIC CELLS IN TISSUE CULTURE. Rus.) Kuznetsova, L. E. (Inst. Exp. Clin. ncol., Acad. Med. Sci. USSR, Moscow). *Biull. ksp. Biol. Med*. 67(2):107-109, 1969.

oth of these carcinogenic metabolites of ryptophan showed mutagenic activity (by inducing hromosomal aberrations) in primary cultures of uman embryonic cells.

9-2530 PARALLELISM BETWEEN CARCINOGENIC ACTIVITY OF 4-NITROQUINOLINE 1-OXIDE ERIVATIVES AND THEIR ABILITY TO INDUCE UNEQUAL UCLEAR DIVISION IN THE SYNCHRONIZED DIVISION F *Tetrahymena*. (E.) Mita, T. (Nat. Cancer tr. Res. Inst., Tokyo) Y. Kawazoe and M. Araki née Tachibana). *Gann* 60(2):155-160, 1969.

nequal nuclear division (with uneven DNA istribution into sister cells) in synchronous ultures of GL strain *Tetrahymena pyriformis* was nduced by 9/9 carcinogenic compounds related to -nitroquinoline 1-oxide (NQO); 9 non-carcino- enic NQO-related compounds had no effect. The effective compounds showed a much higher reaction towards nucleophiles and a higher susceptibility to hydrogenation to the hydroxy-amino derivatives than the ineffective compounds. It was hypothesized that NQO-induced nuclear derangement is initiated through a replacement reaction of the nitro group with sulfhydryl-containing materials *in vivo*, or by a reaction in which 4-hydroxyaminoquinoline 1-oxide is produced by NQO reduction.

69-2531 LYSERGIC ACID DIETHYLAMIDE AND MUTATION. (E.) Zetterberg, G. (U. Uppsala, Sweden). *Hereditas* 62(1-2):262-264, 1969.

Exposure to a soln. of LSD (20-50 mg/liter) did not affect the frequencies of forward or back mutations in suspensions of *Ophiostoma multiannulatum*.

69-2532 LYSERGIC ACID DIETHYLAMIDE AND CHROMOSOME BREAKAGE. (E.) Sturelid, S. (U. Uppsala, Sweden) and B. A. Kihlman. *Hereditas* 62(1-2):259-262, 1969.

In lateral roots of *Vicia faba*, Chinese hamster cell cultures and 2 cultures of human WBC, 2-48 hr. of exposure to LSD (1-50 mg/liter) caused no chromosomal breakage.

69-2533 CHROMOSOME BREAKAGE INDUCED *IN VIVO* BY A CARCINOGENIC HYDROCARBON IN BONE MARROW CELLS OF THE CHINESE HAMSTER. (E.) Kato, R. (Inst. Genet., Lund, Sweden), M. Bruze and Y. Tegner. *Hereditas* (*Lund*) 61(1-2):1-8, 1969.

In 2-3-yr.-old Chinese hamsters inj. with 7,12-dimethylbenzanthracene (DMBA; 4-100 µm/animal, i.p. or s.c.), 2-28 days before sacrifice, the frequency of chromosomal breakage in the bone marrow cells was higher than in untreated controls (2.5-84% and 0.3%, resp.). This effect was dose-dependent. Most of the breaks were single breaks of the delayed isolocus type, with frequent interchromatid exchanges.

69-2534 ABNORMAL VALUES IN CONTROL GROUPS DURING REPEATED-DOSE TOXICOLOGIC STUDIES. (E.) Weil, C. S. (Carnegie-Mellon U., Pittsburgh, Pa.) and C. P. Carpenter. *Toxic. Appl. Pharmacol*. 14(2):335-339, 1969.

An example of significant differences between treated and control groups, definitely attributable to unusual values in controls, is presented for 5 repeated-dose experiments in rats and dogs. In 1 of these experiments, a chronic feeding study using a lubricant compound, some of the treated rats developed tumors during the second yr. of feeding. However, the tumor incidence was higher in the untreated controls (80%) than in the treated rats, and the tumor incidence was not dose-related in the treated animals (44%, 60% and 22% at doses of 0.02, 0.10 and 0.50 g/kg feed, resp.). It is suggested that with values indicative of a true deleterious effect, the difference should be dose-related and should indicate a trend away from the norm of the stock of animals.

69-2535 ANTIGENIC STRUCTURES OF TISSUES IN THE EARLY STAGES OF BENZIDINE CARCINOGENESIS. (Rus.) Zasypka, A. T. (Petrov Res. Oncol. Inst., USSR Min. Pub. Health, Leningrad). Vop. Onkol. 15(3):61-66, 1969.

In hybrid male rats admin. 4 inj. of benzidine (B), B was found as a hapten in a new antigenic component in serum proteins and in liver, spleen and lung tissue. After 15 inj., this antigenic component was seen only in the liver; after 30 inj., the B hapten was not seen in any of the preparations studied.

69-2536 EFFECT OF AGE AND SEX ON CHRONIC THYROIDITIS IN BUFFALO STRAIN RATS INGESTING 3-METHYLCHOLANTHRENE. (E.) Reuber, M. D. (NCI, Bethesda, Md.) and E. L. Glover. Endocrinology 84(2):443-446, 1969.

Male and female inbred Buffalo rats of various ages (4, 12, 24 or 52 wk.) were fed 0.033% 3-methylcholanthrene (MC) in their diets for 12 wk. Thyroiditis (with interstitial plasma cell and lymphocytic infiltration, and acinar cell hyperplasia) was observed at autopsy in both female and male 16-wk.-old animals (11/11 and 7/11, resp.); it occurred more frequently in 24 and 36-wk.-old females (9/12 and 8/11, resp.) than in males of the same ages (3/12 and 4/10, resp.). The incidence in 64-wk.-old females (4/13) was lower than in younger females; in 64-wk.-old males, thyroiditis was seen in 3/15. Some of the animals that did not develop thyroiditis after MC admin. showed microscopic epithelial cysts of the thyroid (4/11 of the 16-wk.-old males; 1/15 and 6/13 of the 64-wk.-old males and females, resp.).

69-2537 DETERMINATION OF ARSENIC CONTENT OF AMERICAN CIGARETTES BY NEUTRON ACTIVATION ANALYSIS. (E.) Lee, B. K. (Iowa State U. Sci. Tech., Ames) and G. Murphy. Cancer 23(6):1315-1317, 1969.

In 52 samples of 33 brands of American cigarettes, the arsenic conc. was 5.5 ± 0.34-12.8 ± 0.79 μg/g tobacco (av. 7.69 ± 0.48 μg/g). Analysis of cigarettes from 7 manufacturers showed an av. arsenic content of 5.9-8.6 μg/cigarette.

69-2538 THE ACUTE EFFECT OF CIGARETTE SMOKE ON THE INITIAL COURSE OF LUNG CLEARANCE IN RABBITS. (E.) Holma, B. (Karolinska Inst., Stockholm). Arch. Environ. Health (Chicago) 18(2):171-173, 1969.

Rabbits inhaled smoke from 4 cellulose acetate-filtered cigarettes (about 8 puffs of 1.5 ml/cigarette), then received an aerosol of ^{51}Cr-tagged polystyrene particles (7 μ in diameter) by tracheal tube. Pulmonary function was studied (clearance of the aerosol) for 15 min.-2 hr. after admin. of the aerosol; during this time, 2 more cigarettes were smoked. A significant decrease in pulmonary function was noted.

69-2539 STIMULATORY EFFECT OF CIGARETTE SMOKING ON THE HYDROXYLATION OF 3,4-BENZPYRENE AND THE N-DEMETHYLATION OF 3-METHYL-4-MONOMETHYLAMINOAZOBENZENE BY ENZYMES IN HUMAN PLACENTA. (E.) Welch, R. M. (Wellcome Res. Labs, Tuckahoe, N. Y.), Y. E. Harrison, B. W. Gommi, P. J. Poppers, M. Finster and A. H. Conney. Clin. Pharmacol. Ther. 10(1):100-109, 1969.

Placental tissue was obtained from 17 smokers and 17 non-smokers (all residents of the New York City area) and studied for 3,4-benzpyrene (BP) hydroxylase and aminoazo dye N-demethylase activities. Neither enzyme was present in placental tissue from the non-smokers; both enzymes were present in tissues from the smokers. BP hydroxylase activities in placentas from the smokers showed wide variations among women smoking the same number of cigarettes/day (10-40/day). In rats, placental BP hydroxylase activity was increased when several polycyclic aromatic hydrocarbons present in cigarette smoke (BP, 1,2-benzanthracene, 1,2,5,6-dibenzanthracene, chrysene, 3,4-benzofluorene, anthracene, pyrene, fluoranthene, perylene, phenanthrene) were admin. during pregnancy.

69-2540 A HEALTH SURVEY OF PETROLEUM ASPHALT WORKERS. (E.) Baylor, C. H. and N. K. Weaver. Med. Bull. Stand. Oil Co. 29(1):5-12, 1969.

A survey of the employees of 7 companies producing petroleum asphalt revealed cancer in 5/462 persons working with asphalt and 6/379 persons working in other locations (for an av. of 15.1 yr.). One of the asphalt workers had stomach cancer and 4 had skin cancer; in 2/4, the skin cancers had been present when they began working with asphalt. The control group included 4 cases of skin cancer, 1 of colon cancer and 1 of lung cancer. Frequencies of non-malignant skin and lung diseases, heart diseases and other conditions were about the same in these 2 groups. A survey of 31 highway construction firms, the Boards of Health or

Highway Commissions of 15 states, 3 large roofing companies, 4 trucking firms and 6 large insurance companies, disclosed no cases of cancer attributed to asphalt exposure, and only a small number of presumably toxic reactions (nasal irritation, dermatitis, etc.).

69-2541 EPIDEMIOLOGICAL STUDY OF ASBESTOS WORKERS IN NORTHERN ITALY. (E.) Vigliani, E. C. (U. Milan, Italy), I. Ghezzi, P. Maranzana and B. Pernis. Med. Lavoro 59(8-9):481-485, 1968.

From April, 1943-December, 1967, 288 persons receiving disability compensation for asbestosis died in northern Italy (Piedmont, Lombardy, Liguria). Malignant tumors were seen in 51/209 men (24.4%) and 13/79 women (16.4%): respiratory tract tumors in 12.9% and 3.8%, resp. (30 cases), g.i. tumors in 7.6% and 6.3%, resp. (21 cases), and other tumors in 3.8% and 6.3%, resp. (13 cases). The 209 men (over 40) with asbestosis were compared to 4215 men with silicosis, and a series of 15,308 men autopsied in hospitals in Turin, Milan and Padua, who died during this period. Lung cancer was seen in 9.6%, 1.2% and 5.0%, resp., and pleural mesotheliomas in 2.4%, 0.0% and 0.3%, resp. In the 209 men with asbestosis, the frequency of lung and pleural tumors was lower in miners, exposed only to chrysotile asbestos (1/32 = 3.1%; no mesotheliomas were seen in miners), than in men exposed to asbestos textile and friction products (11/82 = 13.4%), cement (8/60 = 13.3%) or insulation (5/35 = 14.3%). In the total group of 288 pts. with asbestosis, none died with intrathoracic tumors 15 yr. or less after the onset of asbestos exposure, although 15% of the pts. with pure asbestosis had already died. As of December, 1967, 1010 persons in Piedmont and Lombardy were alive and receiving disability compensation for asbestosis; 2/1010 had undergone surgery for lung cancer.

69-2542 PLEURAL MESOTHELIOMA IN SILICOSIS. (Ger.) Röthig, W. (Miner's Hosp., Stollberg, Germany). Deutsch. Gesundh. 23(46): 2183-2187, 1968.

Pleural mesotheliomas were found in 0.1% of the pts. autopsied at this hospital over the last 10 yr., but only 1 case of pleural mesothelioma associated with silicosis was found (a 38-yr.-old coal miner with Grade I-II silicosis). In guinea pigs or rabbits, intrapleural inj. of 1-3 doses of SiO_2 (50 mg in guinea pigs, 200 mg in rabbits) caused silicosis of varying (dose-dependent) degrees of severity, but no pleural tumors were noted after up to 36 mo. of observation. A literature survey (141 references) disclosed 4 cases of pleural mesothelioma associated with silicosis. It is concluded that unlike asbestosis, silicosis is apparently not correlated with pleural mesothelioma.

69-2543 RETROSPECTIVE SEARCH FOR ASBESTOS BODIES IN NECROPSIES AND BIOPSIES ON CASES OF PRIMARY MALIGNANT DISEASE OF THE LUNG. (E.) Peacock, P. R. (U. Perugia, Italy), C. Biancifiori and E. Bucciarelli. Europ. J. Cancer 5(2):147-153, 1969.

Repeat examination of 23 autopsy specimens, 10/15 surgical specimens (the other 5/15 were scalene node biopsies) and 15 bronchial biopsy specimens of primary lung carcinoma, submitted for histological examination in 1965-1967, revealed no asbestos bodies in any case. It was not possible to establish a definite association between these tumors and any possible causative factors, such as smoking (40 pts. were smokers and 13 were non-smokers or ex-smokers; 1 non-smoker was a tobacco worker). These pts. came from the Perugia area, which has a clear atmosphere and little industry.

69-2544 EXAMINATION OF LUNG SMEARS FOR ASBESTOS BODIES IN 109 CONSECUTIVE NECROPSIES IN PERUGIA. (E.) Peacock, P. R. (U. Perugia, Italy), C. Biancifiori and E. Bucciarelli. Europ. J. Cancer 5(2):155-158, 1969.

Lung smears were obtained from 109 consecutive autopsy cases (104 adults, aged 23-90 yr., and 5 adolescents; 63 males, 46 females), including 21 pts. who died of malignant diseases. All but 13 of these persons had resided in Perugia or nearby towns and villages in Umbria. Only 1 specimen (from an 81-yr.-old man with stomach cancer) showed asbestos bodies. This low frequency (1%), in contrast to the frequency of 20% or more reported in many other areas, was tentatively attributed to the low levels of atmospheric pollution in Perugia; however, primary lung tumors (4 were noted in this series) are about as frequent as in other pathology departments of comparable size. No cases of mesothelioma have yet been reported from this center.

69-2545 CANCEROUS AND PRECANCEROUS LUNG CHANGES: A SLIDE REVIEW. (E.) Auerbach, O. (New York Med. Coll., N. Y.). Ca 19(3):138-145, 1969.

Histological features of the tracheobronchial tree from habitual cigarette smokers, ex-smokers (those who had smoked for at least 10 yr. but had given up cigarettes for at least 5 yr.) and non-smokers are illustrated and discussed. The first changes noted in habitual smokers consisted of extensive proliferation of the basal cells, which became atypical and reached the surface. A lesion containing 5 rows of atypical basal cells was regarded as carcinoma in situ. If smoking was continued, invasion through the basement membrane was possible. Specimens from ex-smokers showed regression of these changes, with contraction and disappearance of the atypical basal cell nuclei and their eventual replacement by vesicular nuclei (the same types of nuclei as seen in specimens from non-smokers).

69-2546 BRONCHOGENIC CARCINOMA IN SITU IN ASYMPTOMATIC HIGH-RISK POPULATION OF SMOKERS. (E.) Valaitis, J. (U. Illinois, Urbana), E. A. McGrew, B. Chomet, N. Correll and J. Head. J. Thorac. Cardiovasc. Surg. 57(3): 325-332, 1969.

Sputum cytology was studied in 4078 asymptomatic subjects over 30 yr. old: 3123 cigarette smokers (at least 1 pack/day for over 10 yr.) and 955 non-smokers. Chest X-rays were performed in about 50% of each group. Sputum specimens showed abnormal cytology in 0.9% of the controls (7/738 evaluable specimens); none showed suspicious or positive cytology. Of the 2785 satisfactory specimens obtained from smokers, 125 showed atypical cytology (4.5%), 7 were suspicious (0.2%) and 3 were positive (0.1%). In addition, 4 smokers with negative sputum cytology showed significant X-ray findings. Lung cancer was confirmed histologically in 2/4, and suspected but not confirmed in 1/4 of these pts.; the other pt. showed hilar lymphadenopathy, but the results of bronchoscopy were negative. Chest X-rays, performed in 60/125 with atypical cytology, 5/7 with suspicious cytology and 3/3 with positive cytology, showed non-specific abnormalities in 9 pts. (8 with atypia, 1 with positive cytology) and no abnormalities in the other pts. Bronchoscopic examination of the 3 pts. with positive cytology showed bronchogenic carcinoma in situ in 2/3 (the diagnosis was confirmed at surgery).

69-2547 EFFECT OF THYMINE ON THE INDUCTION OF LUNG ADENOMAS IN MICE BY URETHAN AND N-HYDROXYURETHAN. (Rus.) Platonova, G. M. (Inst. Exp. Clin. Oncol., USSR Acad. Med. Sci., Moscow) and E. E. Pogosiants. Vop. Onkol. 15(2):66-71, 1969.

In 1.5-2.5-mo.-old A/Sn mice, the frequency of lung adenomas after admin. of urethan (U; 1 mg/g) was higher than in mice admin. the same dose of N-hydroxyurethan (OHU). Admin. of thymine (0.2 mg/g) simultaneously with U or OHU reduced the tumor incidence, but admin. of thymine 24 hr. after U did not affect the tumor incidence. Thymine also partially reduced the frequency of U-induced chromosomal abnormalities in the mouse lung (previously reported).

69-2548 AGE-DEPENDENT SENSITIVITY TO THE CARCINOGENIC ACTION OF URETHAN. (Rus.) Kolesnichenko, T. S. (Inst. Exp. Clin. Oncol., Acad. Med. Sci. USSR, Moscow). Vop. Onkol. 15(3):106-108, 1969.

Strain A mice were admin. 1 or 3 s.c. inj. of urethan (U; 1 mg/g/dose) at various ages; the frequency of lung adenomas was studied 30 days after treatment. In mice admin. 1 inj. of U at ages 7, 14, 21 or 30 days, tumors were seen in 67%, 47%, 51% and 40%, resp. In mice admin. 3 inj. of U (over 3 days) at ages 1-3, 7, 14, 21 or 30 days, lung tumors were noted in 16%, 41%, 42%, 25% and 16%, resp.

69-2549 STUDIES IN THE ETIOLOGY AND PREVENTION OF BLADDER CARCINOMA. (E.) Schlegel, J. U. (Tulane U. Sch. Med., New Orleans, La.), G. E. Pipkin, R. Nishimura and G. A. Duke. J. Urol. 101(3):317-324, 1969.

The effects of ascorbic acid (AA; 1500 mg/day p.o.) admin. on urinary levels of 3-hydroxyanthranilic acid (HOA) and 3-hydroxykynurenine (HOK) were studied in 3 normal non-smokers, 5 normal smokers and 4 pts. with histories of bladder cancer, admin. loading doses of L-tryptophan (2 g). Urinary HOA and HOK levels were no higher in the cancer pts. or smokers than in the non-smokers, but urinary chemiluminescence (which may be a mechanism revealing the carcinogenic potential of the urine) was greater in the smokers and cancer pts. than in the non-smokers. The cancer pts. showed lower urinary AA levels (after AA admin.) and higher levels of cinnabarinic acid (compound IV) than the non-smokers. Admin. of AA suppressed urinary chemiluminescence and prevented the formation of compound IV in all cases. It is suggested that AA might prevent the formation of bladder cancer, by preventing the degeneration of HOA (a carcinogenic metabolite of tryptophan) to compound IV.

69-2550 ROLE OF TRYPTOPHAN METABOLITES IN URINARY BLADDER CANCER. (E.) Bryan, G. T. (U. Wisconsin Sch. Med., Madison). Amer. Industr. Hyg. Ass. J. 30(1):27-34, 1969.

Urinary excretion of 5 tryptophan metabolites (kynurenic acid, acetyl-L-kynurenine, L-kynurenine, 3-hydroxy-L-kynurenine and 3-hydroxyanthranilic acid) was abnormally high in about 50% of a group of pts. with bladder cancer. Xanthurenic acid was excreted in normal quantities. Patterns of excretion of 4 other tryptophan metabolites (xanthurenic acid 8-methyl ether, quinaldic acid, 8-hydroxyquinaldic acid and 3-methoxyanthranilic acid) in bladder cancer pts. are unknown. All of these compounds except kynurenic acid induced bladder carcinomas in mice (about 20-33% of each group developed tumors, compared to about 8% of vehicle-implanted controls), when implanted into the bladders in cholesterol pellets. The presence of a vehicle (cholesterol) was apparently required for the complete expression of the bladder carcinogenicity of these compounds, which interacted with the bladder and passed it eadily. Under similar conditions, o-amino-ippuric acid, indican and anthranilic acid had ittle carcinogenic activity.

9-2551 HISTOPATHOLOGICAL EVOLUTION DURING THE EXPERIMENTAL INDUCTION OF TUMORS OF HE BLADDER. (Sp.) Grande, J. (Fac. Med., alamanca, Spain). Arch. Esp. Urol. 21(4): 79-398, 1968.

n C3H mice admin. single s.c. inj. of 3-methylholanthrene (MC), the tumor incidence ranged rom 85% at 0.062 mg (with a mean latent period f 3.9 mo.) to 100% at 1.0 mg (with a mean atent period of 2.4 mo.). In mice admin. 3,4-enzpyrene (BP), the tumor incidence increased nd the latent period decreased with increasing osages (20-100% and 5.8-3.3 mo., resp.). In ats bladder tumors were induced by implantation f paraffin pellets containing 0.5 or 1.0 mg of ither or both agents, although rats reated by subepithelial or submucosal inj. (bladder wall) with identical doses of MC and/or P in olive oil developed no tumors. A study f the developing tumors over a 5-mo. period showed he most frequent tumor type was a carcinomatous pithelial tumor, including some anaplastic arcinomas which could readily be mistaken or sarcomas. MC alone had the strongest arcinogenic activity; combinations of MC and BP ere the least carcinogenic. Latent periods anged from 15-75 days; animals sacrificed at 4 nd 5 mo. showed cancers of other genitourinary rgans, including the epididymis and the vas eferens.

9-2552 CARCINOGENICITY OF CHEMICAL COMPOUNDS OF RESORPTIVE ACTION. (Rus.) Pliss, . B. (Petrov Res. Inst. Oncol., USSR Min. Pub. ealth, Moscow). Vop. Onkol. 15(2):71-75, 1969.

After prolonged s.c. admin of β-naphthylamine (53-68 mg over 12-15 mo. in mice; 2.15 g over 18 mo. in rats), mice and rats developed tumors at the inj. site; the tumors were more frequent in rats than in mice, but the latent period was longer. In dogs treated s.c. with β-naphthylamine (total, 476 g over 27 mo.), the resulting tumors (as in man) were papillomas and papillocarcinomas of the urinary bladder. The metabolism of this carcinogen in dogs resembles the metabolic pathway in man.

69-2553 PATHOMORPHOLOGY OF TUMORS INDUCED BY BENZOQUINOLINE-69. (Rus.) Khaletskaia, F. M. (Med. Inst., Perm, USSR). Vop. Onkol. 15(2):78-81, 1969.

Benzoquinoline-69 (synthesized from β-naphthylamine) was admin. repeatedly (s.c.) to 50 rats and 50 mice (controls were inj. s.c. with vegetable oil). The treated rats and mice developed both tumors at the inj. site (polymorphocellular sarcomas) and benign and malignant tumors of the liver and bile ducts (hepatomas in mice; hepatocellular carcinomas, adenocarcinomas and adenomas in rats). The compound apparently had primarily hepatotropic and cholangiotropic activity.

69-2554 RENAL ADENOMAS INDUCED IN RATS BY DIMETHYLNITROSAMINE. AN ELECTRON MICROSCOPIC STUDY. (E.) Jasmin, G. (U. Montreal Fac. Med., Canada) and J. W. Cha. Arch. Path. (Chicago) 87(3):267-278, 1969.

Renal adenomas, induced in Wistar rats by 6 days of p.o. admin. of dimethylnitrosamine (0.8 mg/100 gm/day), were examined by light and electron microscopy 7 mo. later. Toluidine blue or silver methenamine staining revealed light and dark staining cells with intermediate gradations. The light cells contained a small number of well-formed organelles, while the dark cells were more differentiated. Some adenoma cells with tightly packed and non-oriented mitochondria showed regressive changes, with chromatin clumping and increased osmophilia. Pleomorphic dense bodies, similar to those in normal tubular cells, were disseminated throughout the cytoplasm of both light and dark cells. It is suggested that these dense bodies and the extremely large number of mitochondria may explain the high level of oxidative and hydrolytic enzyme activities seen in these tumor cells.

69-2555 HEXOKINASE ACTIVITIES IN NORMAL, HYPERPLASTIC AND CANCEROUS EPIDERMIS OF MICE. (E.) Adachi, K. (Oregon Reg. Prim. Res. Ctr., Beaverton), S. Yamasawa, R. R. Suskind and G. Christian. Nature (London) 222(5189):191-192, 1969.

Skin sections from C3H mice receiving paintings of 3,4-benzpyrene (BP; 0.14% in decalin, with or without added dodecane accelerator) solvent-treated mice and controls (cancerous, hyperplastic and normal epidermis, resp.) were assayed fluorometrically for hexokinase activity 4-49 wk. after the beginning of treatment. A high level of hexokinase activity was observed at the edges of the tumor cells, and in cells of hyperplastic epidermis from mice treated with either BP or solvent (compared to the controls). If high hexokinase activity is presumed to be an enzymatic criterion for malignancy, it can be concluded that cells of a recognizable tumor have already begun the somatic mutation from hyperplastic epidermoid cells.

69-2556 THE EFFECT OF DIMETHYL SULFOXIDE AND TOPICAL TRIAMCINOLONE ON CHEMICAL CARCINOGENESIS OF HAMSTER BUCCAL POUCH. (E.) Siegel, W. V. (Tufts U. Sch. Dent. Med., Boston, Mass.) and G. Shklar. Oral. Surg. 27(6):772-779, 1969.

Unilateral cheek pouch painting (3 doses/wk. for 10 wk.) was performed in 6-mo.-old Syrian or golden hamsters, using 7,12-dimethylbenzanthracene (DMBA; 0.5% in mineral oil), dimethyl sulfoxide (DMSO; 70%) and triamcinolone (T; 0.025% in petrolatum base), alone or in combination. Coagulation degeneration of the connective tissue and epithelial atrophy were seen after 10 wk. in all cheek pouches painted with DMBA + DMSO or with DMBA + DMSO + T; vesicle formation was noted in 7/10 and 9/10, resp., fibrosarcomas of the connective tissue in 0/10 and 2/10, resp., and epidermoid carcinomas in 4/10 and 0/10, resp. All cheek pouches painted with DMBA alone or DMBA + T showed epidermoid carcinomas. No pathological changes were seen in the cheek pouches of untreated controls or animals admin. DMSO or T alone. Responses to these agents were about the same in males and females. It is concluded that DMSO carried DMBA through the epithelium to the connective tissue, where degenerative coagulation took place, but that DMBA was not an effective carcinogen in this degenerative tissue. By causing more severe damage, T further retarded the development of carcinomas.

69-2557 THE EFFECT OF INGESTED ARSENIC ON METHYLCHOLANTHRENE-INDUCED SKIN TUMORS IN MICE. (E.) Milner, J. E. (U. Washington, Seattle). Arch. Environ. Health (Chicago) 18(1):7-11, 1969.

Male and female C x C3H mice (Group I), female DBA mice (Group II) and female Balb/c mice (Group III) were fed arsenic trioxide (0.01% in the drinking water) for 8, 4 and 2 wk., resp., before 2-3 wk. of topical application of 3-methylcholanthrene discs (MC); arsenic admin. was continued during MC application. The tumors were promoted by syngeneic grafting of the MC-treated skin onto the skin of recipients, which were fed arsenic water during the 8-wk. observation period. A statistically insignificant increase in the number of papillomas was noted in Group II: 5/16 (30%), compared to 1/10 (10%) in controls not treated with arsenic. An opposite effect (statistically significant) was noted in Group I; the arsenic-treated animals showed a lower frequency of papilliomas (9/28 = 33%) than the controls 17/29 = 65%. Papillomas were more frequent in Group III (60%) than Group II, but the effect of arsenic seemed negligible. The latent period of papilloma development after grafting was longer than control values in arsenic-treated mice of Groups II and III (5.4 and 3.9 wk. resp., compared to 4 and 3 wk., resp., in controls); in Group I, latent periods in arsenic-treated and control mice were 5 and 6.1 wk., resp.). The number of malignant tumors seemed to decrease in the arsenic-treated mice of Group I animals (1 tumor, compared to 4 in controls). Only 2 carcinomas developed in Group III and none in Group II.

69-2558 INDUCTION OF SKIN TUMORS IN MICE BY PAINTING WITH 4-HYDROXYAMINOQUINOLINE 1-OXIDE. (E.) Hozumi, M. (Nat. Cancer Ctr. Res. Inst., Tokyo). Gann 60(2):161-165, 1969.

Female ICR Swiss mice (55 days old) were painted with a single dose of 7,12-dimethylbenzanthracene (DMBA; 125 µg), followed 3 wk. later by painting with 4-hydroxyaminoquinoline 1-oxide (HAQO; 625 µg in dimethyl sulfoxide; 6 doses over 2 wk., then 1 dose/wk. for 18 wk.). By 200 days after the beginning of HAQO admin., 15/30 mice developed skin tumors (13 papillomas, 3 squamous cell carcinomas, 1 fibrosarcoma, 1 carcinosarcoma), compared to only 1/26 controls receiving only the HAQO vehicle (dimethyl sulfoxide). In another experiment, 12/30 mice painted with HAQO alone developed skin tumors (28 papillomas, 10 malignant tumors) by 180 days; no tumors developed in controls receiving dimethyl sulfoxide. Although the effect of DMBA on HAQO carcinogenesis was not significant, dimethyl sulfoxide seemed to augment HAQO activity, possibly through lysosome activation.

69-2559 PULMONARY METASTASES AND ALLO-TRANSPLANTABILITY (MOUSE SARCOMAS INDUCED BY METHYLCHOLANTHRENE). (It.) Maltzeff, N. (U. Perugia, Italy). Lavori Ist. Anat. Univ. Perugia 28(3):129-144, 1968.

Sarcomas S_1 and S_2, induced in (RIII x C+)F_1 and (C3HB x C+)F_1 mice, resp., by s.c. admin. of 3-methylcholanthrene, were transplanted into mice of strains C+ (BALB/Cf/Cb/Se), RIII/Dm/Se, $C3H_fB$/Had/Se or C57BL/Cb/Se, and in hybrids of C+ and the other 3 strains. Another tumor (designated S_3) was obtained by inoc. of the third transplant generation (TG-3) of S_2 into newborn C+ mice. S_1 remained strain-specific through TG-10 and never formed lung metastases. S_2 was transplantable into C+ (but not C3HB) mice beginning with TG-12, and lost all strain-specificity in TG-14. S_3 was transplantable into all strains beginning with TG-1. The allotransplantability of these tumors corresponded to their capacities to induce lung metastases and to elicit second-set responses (after surgical removal of the first-set tumors). Only the non-strain-specific tumors formed lung metastases. Removal of the primary tumors (usually during wk. 3 or 4 after transplantation) facilitated the subsequent development of lung metastases in mice bearing allotransplantable implants of S_2 (TG-12 and later generations), and was apparently necessary for the development of lung metastases in mice bearing S_3.

69-2560 TUMOR-INDUCING EFFECT OF POLYCAPROLACTAM DISKS AFTER GAMMA-IRRADIATION OR COATING WITH PARAFFIN. (Rus.) Pustogarova, G. A. (Res. Roent.-Radiol. Oncol. Inst., Kiev, USSR). Vop. Onkol. 15(2):75-77, 1969.

Untreated, γ-irradiated (100 megarads) or paraffin-coated polycaprolactam disks, implanted s.c. into rats, induced tumors in 17/41, 14/37 and 2/41 animals, resp. It is concluded that a chemical reaction between the plastic and the surrounding tissues is 1 of the causes of such tumors.

69-2561 THE CONVERSION OF THE CARCINOGEN N-HYDROXY-2-FLUORENYLACETAMIDE TO o-AMIDOPHENOLS BY RAT LIVER IN VITRO. AN INDUCIBLE ENZYMATIC REACTION. (E.) Gutmann, H. R. (U. Minnesota, Minneapolis) and R. R. Erickson. J. Biol. Chem. 244(7):1729-1740, 1969.

A 2-step reaction sequence induced by 3-methylcholanthrene and other polycyclic hydrocarbons, is formulated for the isomerization of N-hydroxy-2-fluorenylacetamide (N-OH-FAA). Initially, N-OH-FAA is dehydroxylated by an enzyme of the soluble fraction of rat liver to a positively charged amidonium ion, which may then undergo reduction or isomerization. The hydroxyl ions then add to the electrophilic carbon atoms 1 and 3 of the resonance forms of the amidonium ion to form the o-amidofluorenols, N-(1-hydroxy-2-fluorenyl) acetamide and N-(3-hydroxy-2-fluorenyl)-acetamide. An alternative sequence may provide for transfer of hydride ions to the positively charged nitrogen of the amidonium ion, yielding N-2-fluorenylacetamide, which is deacetylated to 2-fluorenamine.

69-2562 IN VIVO METHYLATION OF RAT LIVER RNA AND THE EFFECT OF DIETHYLNITROSAMINE. (Ger.) Kröger, H. (U. Freiburg i. Br., Germany), P. Kahle and H. Kessel. Hoppe Seyler Z. Physiol. Chem. 349(12):1725-1732, 1968.

In vivo RNA methylation was studied in the livers of Sprague-Dawley rats (Ivanovas strain) inj. with ^{3}H- or ^{14}C-labeled methionine or ^{14}C-labeled orotic acid. In the livers of normal rats, ribosomal RNA (rRNA) arose from a methylated 45S RNA precursor in the nucleus, whereas transfer RNA (tRNA) was methylated in the cytoplasm or nuclear sap. In premalignant liver lesions induced by 30 days of diethylnitrosamine feeding (doses not stated), in vivo orotic acid incorporation into RNA and rRNA methylation were decreased, but tRNA methylation remained unchanged.

69-2563 EXPERIMENTAL INDUCTION OF HELICAL POLYSOMES IN ADULT RAT LIVER. (E.) Monneron, A. (Cancer Sci. Res. Inst., Villejuif, France). Lab. Invest. 20(2):178-183, 1969.

Single doses of lasiocarpine (80 mg/kg i.p.) or aflatoxin (250 μg/rat i.p.) were admin. to intact or partially hepatectomized adult male Wistar rats. Electron microscopic examination of the livers (up to 48 hr. later) showed many structures resembling helical polysomes (approx. 400 A in diameter and 1 μ long) in the cytoplasm (especially in the neighborhood of the nucleus), as early as 10 min. after inj. of either agent. Admin. of actinomycin D (AD) alone did not induce the formation of these structures; admin. of AD (at a dose blocking only nucleolar RNA synthesis), 3 hr. before inj. of either carcinogen, did not inhibit their formation. This sudden and early occurrence of helical polysomes after admin. of these carcinogens was attributed to the production of a special type of transient messenger RNA.

69-2564 THE FINE STRUCTURE OF PROLIFERATING CELLS IN PRENEOPLASTIC RAT LIVERS DURING AZO-DYE CARCINOGENESIS. (E.) Karasaki, S. (U. Montreal, Canada). J. Cell Biol. 40(2):322-335, 1969.

Ultrastructural examination of preneoplastic liver tissue from adult male albino Wistar rats fed a diet containing N,N'-dimethyl-4-aminoazobenzene (DAB; 0.06% for 3-5 mo.) showed evidence of basophilic foci. The only proliferating cells found in these foci (as demonstrated by nuclear thymidine-^{3}H uptake) were poorly differentiated; the well differentiated hepatocytes were not labeled. The labeled cells showed a high nucleocytoplasmic ratio and an irregular cell outline, while nearly all of the cytoplasmic elements characteristic of hepatocytes were absent. The abnormal nuclei and mitochondria, and the increased numbers of free ribosomes found in the labeled cells, were also characteristic of DAB-induced tumor cells. It is concluded that hyperbasophilic foci may be the area of extensive hepatic dedifferentiation, which is followed by proliferation and then by neoplastic growth.

69-2565 ROLE OF SPLEEN IN MODIFICATION OF CELL ANTIGENS DURING AMINOAZODYE CARCINOGENESIS IN RAT LIVER: AN IMMUNOLOGICAL STUDY. (E.) Sengupta, P. (Med. Coll., Calcutta, India) and B. K. Aikat. Indian J. Med. Res. 56(10):1495-1501, 1968.

Cytoplasmic fractions of liver cell homogenates from intact or splenectomized (splx.) 3-4-mo.-old Wistar rats fed 3'-methyl-4-dimethylaminoazobenzene (MDAB; 0.06% in diet for 20 wk.), and from untreated controls, were reacted with antisera against the cytoplasmic fraction of normal liver. Fractions from MDAB-fed intact or splx. rats showed significant differences in the promptness of emergence or unmasking of normal antigenic components, and the subsequent masking or deletion of tissue-specific antigens at the time of liver tumor development. The liver cytoplasmic fractions from intact rats showed an early emergence of an antigenic component, which was later suppressed, whereas fractions from splx. rats showed a late emergence of the antigenic component, which was not suppressed at 20 wk. It is suggested that splx. interfered with an essential specific immune response by removing a bulk of immunologically competent cells.

69-2566 CARCINOMA OF THE GLANDULAR STOMACH OF MICE INDUCED BY 4-HYDROXYAMINOQUINOLINE 1-OXIDE HYDROCHLORIDE. (E.) Mori, K. (Sch. Med., Showa U., Tokyo) A. Ohta, T. Murakami, M. Tamura and M. Kondo. Gann 60(2):151-154, 1969.

In 6-wk.-old dd strain female mice, p.o. admin. of 4-hydroxyaminoquinoline 1-oxide HCl (0.25-1.0 mg every 10 days; total 6 mg) induced adenocarcinomas of the glandular stomach in 3/66, mucosal carcinomas in 19/66 and epidermoid carcinoma in 1/66 of the animals surviving more than 207 days.

69-2567 EXPERIMENTAL CARCINOMA OF THE GLANDULAR STOMACH IN RATS. I. EFFECT OF 7,12-DIMETHYLBENZ(a)ANTHRACENE OR 4-NITROQUINOLINE 1-OXIDE PLACED ON GLANDULAR STOMACH COMBINED WITH ORAL ADMINISTRATION OF N,N'-(2,7-FLUORENYLENE) BISACETAMIDE OR N-NITROSODIETHYLAMINE. (E.) Odashima, S. (Sasaki Inst., Tokyo). Gann 60(2):211-222, 1969.

When male Donryu rats received 7,12-dimethylbenzanthracene (DMBA) or 4-nitroquinoline 1-oxide (NQO; both 8 mg in beeswax), placed on the surface mucosa of the glandular stomach, together with N,N'-(2,7-fluorenylene)bisacetamide (2,7-FAA; 0.025% in the diet) or N-nitrosodiethylamine (DENA; 0.75 mg/day in the drinking water), many rats died from tumors of the liver and/or esophagus before tumors developed in the target organ. Simple scars, ulcers, atypical glands, adenomas, polyps, carcinomas and carcinosarcomas of the stomach were found only at the site of treatment. The combination of NQO and 2,7-FAA induced the largest number of stomach lesions, followed by DMBA + 2,7-FAA and NQO + DENA. DMBA or NQO alone inhibited the development of 2,7-FAA-induced liver tumors, but failed to inhibit DENA-induced liver and esophageal tumors.

69-2568 EFFECT OF SALIVARY GLAND EXTIRPATION ON THE CARCINOGENESIS OF RAT STOMACH BY 4-NITROQUINOLINE 1-OXIDE. (E.) Ito, M. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan), S. Yamada, H. Suzuki and T. Nagayo. Gann 60(2):223-225, 1969.

In 2-mo.-old Sprague-Dawley rats with all major salivary glands excised, p.o. admin. of 4-nitroquinoline 1-oxide (NQO; 3 doses/wk. of 1 mg for 14 wk., beginning 1 wk. postoperatively) induced malignant stomach tumors (seen at sacrifice 13 mo. after NQO admin.) in 5/10 rats surviving 6 mo.: 3 squamous cell carcinomas, 1 leiomyosarcoma and 1 adenocarcinoma. NQO admin. induced a malignant stomach tumor in only 1/4 controls with intact salivary glands. Benign lesions of the stomach were less frequent in the controls than in the operated group.

69-2569 SPONTANEOUS FORMATION OF CARCINOGENIC NITROSAMINES IN THE STOMACH. (Ger.) Sander, J. (U. Tübingen, Germany), F. Schweinsberg and H.-P. Menz. Hoppe Seyler Z. Physiol. Chem. 349(12):1691-1697, 1968.

Under experimental conditions reproducing those of the mammalian stomach, secondary amines reacted with nitrous acid in dilute aqueous soln. to form nitrosamines. The yield was much greater with weakly basic secondary amines than with strongly basic amines; optimum yields were seen at pH 1-3. In female Sprague-Dawley rats fed diets containing sodium nitrite (0.15%) + either diphenylamine (0.01%) or N-methylaniline (N-MA; 0.03%), the yield of nitrosamines (diphenylnitrosamine and N-nitroso-N-methylaniline, resp.) in the gastric contents 2 hr. later was much higher in rats fed diphenylamine than in those fed N-MA (31.5% and about 4%, resp., of the max. theoretical yield). In rats fed for 30 days with diets containing 1% sodium nitrite and various conc. of N-MA, the resulting body wt. loss increased with increasing doses of N-MA. A similar experiment, using diets containing 0.03% N-MA and varying conc. of sodium nitrite, gave similar results. Rats fed for 8 wk. with diets containing equal conc. of N-methylbenzylamine (N-MB) and sodium nitrite (0.5%), followed by a normal diet, began to die with multiple tumors of the esophagus after 6 wk. on the normal diet. No tumors or deaths were noted in rats fed N-MB alone. It is concluded that a nitrite and a secondary amine must be present simultaneously in the stomach in order to form carcinogenic nitrosamines.

69-2570 THE EFFECTS OF SCHEDULE AND DOSE OF 7,12-DIMETHYLBENZ(a)ANTHRACENE ON THE INDUCTION AND GROWTH OF MAMMARY CARCINOMAS IN SPRAGUE-DAWLEY FEMALE RATS. (E.) Shimkin, M. B. (Temple U. Sch. Med., Philadelphia, Pa.), M. Gruenstein, D. R. Meranze, M. Acuff and D. Thatcher. Cancer Res. 29(3):503-505, 1969.

Female Sprague-Dawley rats (aged 51 days) were treated p.o. with 7,12-dimethylbenzanthracene (DMBA) at 3 different total doses (15, 25 or 45 mg) and in 3 different regimens (single doses, or 5 doses at intervals of 2 days or 1 wk.). At each total dosage of DMBA, the induction and subsequent growth rate of mammary tumors was slightly less in the rats admin. DMBA at 2-day intervals than in animals admin. single doses;

the greatest tumor induction was seen when DMBA was admin. at 1-wk. intervals.

69-2571 INFLUENCE OF HYPOTHALAMIC LESIONS ON THE INDUCTION AND GROWTH OF MAMMARY CANCERS IN SPRAGUE-DAWLEY RATS RECEIVING 7,12-DIMETHYLBENZ(a)ANTHRACENE. (E.) Klaiber, M. S. (Temple U. Sch. Med., Philadelphia, Pa.), M. Gruenstein, D. R. Meranze and M. B. Shimkin. Cancer Res. 29(5):999-1001, 1969.

In female Sprague-Dawley rats, induction of hypothalamic lesions (HL; by stereotaxic injury to the median eminence of the tuber cinereum) inhibited the development of mammary tumors induced by subsequent p.o. admin. of 7,12-dimethylbenzanthracene (DMBA). In rats with mammary tumors already established (by a 5-wk. course of DMBA), however, induction of HL accelerated tumor growth. Under these circumstances, HL also abolished the inhibitory effect of oophorectomy.

69-2572 HORMONAL STEROIDS IN THE TISSUE OF INDUCED RAT MAMMARY TUMOURS. (E.) Briziarelli, G. (Warner-Vister Steroid Res. Inst., Como, Italy), A. Lusignani and C. Pedrali. Biochem. J. 112(1):35-39, 1969.

Extraction, chemical separation (saponification) and thin-layer chromatography of tissue from 7,-2-dimethylbenzanthracene-induced mammary adenocarcinomas of Sprague-Dawley rats, disclosed the presence of cholesterol, estrone, androst-4-ene-3,17-dione, androst-1,4-diene-3,17 dione, and 5β-androst-1-ene,3,17-dione (the last steroid has not previously been identified from natural sources).

69-2573 LYSOSOMAL ENZYME CHANGES IN GROWING AND REGRESSING MAMMARY TUMOURS. (E.) Shamberger, R. J. (Roswell Park Mem. Inst., Buffalo, N. Y.). Biochem. J. 111(3):375-383, 1969.

Hormone-dependent mammary tumors, induced by a single dose of 7,12-dimethylbenzanthracene (15 mg) in Sprague-Dawley rats, showed a significant increase in all lysosomal enzymes (β-glucuronidase, β-galactosidase, cathepsin, acid RNase, arylsulfatase A and acid phosphatase) during postpartum tumor regression, but several non-lysosomal enzymes did not increase. Activities of all but 1 of the lysosomal enzymes also increased in the postpartum uterus (arylsulfatase A activity decreased). No other significant changes in the lysosomal or non-lysosomal enzymes were noted in the livers or normal mammary glands.

69-2574 HORMONAL PREVENTION OF DYSHORMONAL MAMMARY GLAND HYPERPLASIA IN MICE. (Rus.) Dmitriev, V. N. (Med. Inst., Izhevsk, USSR). Vop. Onkol. 15(1):59-61, 1969.

Premalignant hyperplasia of the mammary glands developed in 91% of 36 mice treated with 3,4-benzpyrene (BP; 1 mg) alone, and in 71% of 37 mice treated with BP and exposed to continuous light (CL). Admin. of testosterone propionate (0.03 ml of 5% soln., 1 dose/wk.) to 36 mice admin. BP, or 35 mice treated with BP + CL, reduced the frequency of mammary hyperplasia in each group to 29%. During the period of mammary hyperplasia, the mice also showed prolonged estrous cycles and some proliferation of the ovarian interstitial tissue; BP + CL-treated mice also showed increased urinary estrogen levels.

69-2575 EFFECT OF PARENTERAL STEROIDS ON INDUCTION OF GENITAL TUMORS IN MICE BY 20-METHYLCHOLANTHRENE. (E.) Blanzat-Reboud, S. (U. Besançon, France) and A. G. Russfield. Amer. J. Obstet. Gynec. 103(1):96-101, 1969.

In intact, mature B6AF1 mice, insertion of 3-methylcholanthrene (MC)-impregnated threads into the cervical canal induced adenoacanthomas of the uterus in 14%, and squamous cell carcinomas of the cervix and vagina in 29% and 14%, resp. Implantation (s.c.) of pellets containing ethynylestradiol 3-methyl ether (mestranol; M), norethynodrel (N), progesterone (P), diacetoxy-6α-methylpregn-4-en-20-one (BL-141), or M + 1 of these progestational agents, simultaneously with the admin. of MC, modified the histological types and anatomical sites of MC-induced tumors. Admin. of the 3 progestational hormones alone significantly increased the total number of tumors, while admin. of M did not. Admin. of M and/or N significantly increased the number of uterine tumors, however; this effect of M was not inhibited by BL-141 or P. Admin. of M together with the progestational hormones did not inhibit their tumor-promoting effects, but sometimes changed the patterns of tumor development; for example, P- or BL-141-enhanced development of tumors of the cervix was inhibited by M.

69-2576 BEHAVIOR OF THE UTERINE CERVIX OF THE GOLDEN HAMSTER AFTER THE APPLICATION OF ESTROGENS COMBINED WITH 3,4-BENZPYRENE AND AGENTS WHICH ARE TOXIC DURING METAPHASE. COMPARATIVE CYTOHISTOLOGICAL STUDY. (Sp.) Llombart, A., Jr. (Fac. Med., Valencia, Spain) and C. Paredes. Acta Ginec. 20(2):99-110, 1969.

Three groups of 3-mo.-old golden hamsters were treated with i.m. inj. of diethylstilbestrol (2 inj./wk. of 1 mg) and topical vaginal applications of 3,4-benzpyrene (2 doses/wk. of 0.05% soln. in acetone), together with topical vaginal applications (1 dose/wk.) of podophyllin (P; 10% soln. in oil), 2-amino-D-glucopodophyllotoxin (LH22B; 1% soln.) or podophyllic acid ethyl hydrazide (SP-I; 1% soln.). Papanicolaou cervical smears were obtained and classified cytologically at 1-mo. intervals for 15 mo. The highest degree of potential malignancy seen in any of these animals was classified as Type III, in 9/21 admin. P, 8/28 admin. LH22B and 4/23 admin. SP-I. No Type IV or V smears were seen in any of the animals; only 1/21 admin. P and 1/23 admin. SP-I showed lesions that could be described histologically as premalignant. The lesions noted were non-specific reactive epithelial hyperplasia, which progressed to erosive, necrotic cervicitis, but none of the animals developed a true malignancy. These lesions persisted throughout life in some animals and regressed (to atrophic cervicitis) in others.

69-2577 HORMONALLY ACTIVE OVARIAN TUMORS IN RABBITS INDUCED BY METHYLCHOLANTHRENE, TWO YEARS AFTER THE EXPERIMENT. (Pol.) Różewicki, S. (Polish Med. Acad., Szczecin, Poland) and B. Pohnke. Pat. Pol. 20(1):73-84, 1969.

Sexually mature female rabbits (6-9 mo.) received implants of 3-methylcholanthrene (MC; 20 mg) into 1 ovary. The animals were then divided into 2 groups: animals of group A (20/35 rabbits) were not mated, while those of Group B (15/35 animals) were mated every 6 mo. and went through estrus, pregnancy and lactation. Hormonally active tumors of the luteoma or thecoma type developed in 4 animals of each group, 24-32 mo. later. They appeared slightly sooner in Group B (av. 27 mo.) than in Group A (av. 27.5 mo.). Normal fertility was maintained in rabbits of Group B up to the time of tumor development, but the av. number of offspring/litter fell from 6 (after 6 mo. of observation) to 3.07 and 1.71 after 24 and 30 mo. of observation, resp. Histological structures of non-tumor-bearing ovaries in both experimental groups were normal, except that the medullas of the MC-implanted ovaries contained spaces emptied of MC, surrounded by granulation tissue. The uteri of rabbits without tumors were normal; the uteri of rabbits with tumors showed changes indicating that the tumors were hormonally active. It is concluded that periodic estrus, pregnancy, delivery and lactation has no effect on the development of MC-induced ovarian tumors in rabbits.

69-2578 A NEW TYPE OF TRANSPLANTABLE ADRENAL TUMOR AND ITS COMPARATIVE HISTOPATHOLOGY. (E.) Mody, J. K. (Cancer Res. Inst., Tata Mem. Ctr., Bombay). Cancer Res. 29(6):1254-1261, 1969.

In intact, sterile-mated or mammectomized 10-16-wk.-old C3H/Jax virgin female mice receiving 7,12-dimethylbenzanthracene (DMBA), either p.o. (1 dose of 0.2 ml of 1% soln. in olive oil) or in 8 paintings (1 dose/wk.), adrenal tumors developed in 10-30% of all groups, except the intact mice receiving DMBA paintings. The highest incidence (9/30) was seen in intact mice receiving a single p.o. dose of DMBA. No premalignant structural changes or altered adrenal histology were observed. The tumors were undifferentiated and sometimes involved both adrenals. Serial s.c. transplants of the tumors took in 21/41 males and 19/26 females; these tumors resembled the original tumor, but were more pleomorphic and showed increased mitotic activity. Both the DMBA-induced and transplanted tumors showed "corticoid" granules, which were not seen in other host organs. The subcapsular mesenchymal A cell was apparently the cell of origin. The initiation stage of these tumors was inhibited by androgens.

69-2579 ACUTE ERYTHROMYELOSIS AFTER BENZENE POISONING. (E.) Rozman, C. (U. Salamanca, Spain), S. Woessner and J. Saez-Serrania. Acta Haemat. (Basel) 40(4):234-237, 1968.

A 58-yr.-old man with acute erythromyeloid leukemia, which developed after 30 yr. of occupational benzene exposure (varnish) in a closed environment, is described. The clinical and hematological findings (such as the periodic acid-Schiff-positivity of the erythroblasts) were similar to those seen in the non-benzene-induced erythroleukemias; however, the "diploerythroblasts" seen in the bone marrow suggested benzene as the causative factor.

69-2580 DEVELOPMENT OF LEUKEMIA IN RATS BY ORAL ADMINISTRATION OF N-NITROSOBUTYLUREA IN THE DRINKING WATER. (E.) Odashima, S. (Sasaki Inst., Tokyo). Gann 60(2):237, 1969.

In 11-wk.-old female Donryu rats, 125-167 days of treatment with N-nitrosobutylurea (total 501-750 mg in the drinking water) induced leukemia in 54/64. The thymus and lymph nodes (except some mesenteric nodes, which showed metastatic lesions) were not involved; the leukemia was probably of erythroblastic origin. Small papillomas and/or slight papillomatosis of the forestomach developed in 45/64 treated rats; 5 rats developed ear duct carcinomas.

69-2581 OBSERVATIONS ON AN EFFECT OF ACTH, DEXAMETHASONE, AND DIMETHYL SULFOXIDE ON THE "OUT OF STRAIN" TRANSPLANTATION AND LETHALITY OF STRAIN 2 GUINEA PIG LEUKEMIA L_2C/NB TO STRAIN 13 AND HARTLEY ANIMALS. (E.) Nadel, E. M. (St. Louis U. Sch. Med., Mo.), J. G. Noble, Jr. and S. Burstein. Cryobiology 5(4):254-261, 1969.

In inbred strain 13 and Hartley guinea pigs, pretreatment with dimethyl sulfoxide (1 ml of 50% saline soln. i.p.) markedly decreased the latent period for leukemia development after transplantation of L_2C/NB leukemia (from strain 2 guinea pigs). Similar results were observed with ACTH and dexamethasone.

69-2582 THE STIMULATION OF TUMOR CELL GROWTH BY A SUBSTANCE PRODUCED BY NORMAL AND TUMOR CELLS. (E.) Ichikawa, Y. (Weizmann Inst. Sci., Rehovot, Israel), M. Paran and L. Sachs. *J. Cell. Physiol.* 73(1):43-47, 1969.

The growth of several mouse tumors (P1081 myeloid leukemia, CICPR erythroleukemia, L-1210 or MDA lymphatic leukemias or MT sarcoma) was stimulated by feeder layers of several types of normal mouse cells (peritoneal macrophages, mixed embryo, spleen and kidney cells), and normal rat peritoneal granulocytes. All of these cell types (including the rat cells) produced a dialyzable substance which stimulated the growth (cloning efficiency and the number of cells/clone) of both the normal and the malignant mouse cells. This substance was also found in conditioned medium.

69-2583 OXIDATION OF CARCINOGENIC AZO DYES. II. OXIDATION OF N,N-DIMETHYL-4-AMINOBENZENE BY DIFFERENT OXIDIZING AGENTS. (Ger.) Matrka, M. (Res. Inst. Org. Syntheses, Pardubice-Rybitvi, Czechoslovakia), J. Marhold, Z. Ságnev and J. Pipalová. *Coll. Czech. Chem. Commun.* 33(11):3761-3768, 1968.

69-2584 PRODUCTION OF RESPIRATION-DEFICIENT MUTANTS IN YEAST BY A CARCINOGEN, 4-NITROQUINOLINE 1-OXIDE. (E.) Nagai, S. (Nat. Women's U., Nara, Japan). *Mutation Res.* 7(3):333-337, 1969.

69-2585 ACUTE TOXICITY OF AFLATOXINS B_1 AND G_1 IN THE RAINBOW TROUT (*Salmo gairdneri*). (E.) Bauer, D. H. (Oregon State U., Corvallis), D. J. Lee and R. O. Sinnhuber. *Toxic. Appl. Pharmacol.* 15(2):415-419, 1969.

69-2586 BIOCHEMICAL EFFECTS OF AFLATOXIN IN PIGS. (E.) Grumbmann, M. R. (U.S. Dept. Agricult., Albany, Calif.) and S. N. Williams. *Toxic. Appl. Pharmacol.* 15(2):393-404, 1969.

69-2587 COCONUT AS A MEDIUM FOR THE EXPERIMENTAL PRODUCTION OF AFLATOXIN. (E.) Arseculeratne, S. N. (U. Ceylon, Peradeniya), L. M. De Silva, S. Wijesundera and C. H. S. R. Bandunatha. *Appl. Microbiol.* 18(1):88-94, 1969.

69-2588 MULTIPLE EPITHELIOMATOSIS ON PROBABLE ARSENICISM. (Fr.) Duperrat, B., G. Goetschel and G. Rousselet. *Bull. Soc. Franc. Derm. Syph.* 75(6):760-762, 1968.

69-2589 CHLORAMPHENICOL AND ACUTE LEUKEMIA. (E.) Goh, K. O. *ORAU-Res. Rep.* (107):108-112, 1968.

69-2590 MOUSE MAMMARY CARCINOMA INDUCED BY PITUITARY ISOGRAFTS IN MAMMARY FAT PADS. (E.) Dux, A. (Netherlands Cancer Inst., Amsterdam) and O. Mühlbock. *Proc. Soc. Exp. Biol. Med.* 130(2):355-359, 1969.

69-2591 FINE STRUCTURE OF SPONTANEOUS AND ESTROGEN-INDUCED SECRETION IN BREAST TUMORS IN THE RAT INDUCED BY 7,12-DIMETHYLBENZ(α)ANTHRACENE. (E.) Archer, F. L. (U. Chicago, Ill.). *J. Nat. Cancer Inst.* 42(3):347-362, 1969.

See also abstract nos.: 2496,2497,2498,2502,2505,2506,2510,2518,2522,2616,2666,2668,2672,2674,2677

69-2592 THE ACTIVITY OF CELL-FREE TUMOUR FRACTIONS IN INDUCING IMMUNITY ACROSS A WEAK HISTOCOMPATIBILITY BARRIER. (E.) Wolf, A. (Beatty Res. Inst., Belmont, Sutton, England). Transplantation 7(1):49-58, 1969.

DBA/2 and CBA mice were actively immunized for various periods of time by i.p. inj. of different cell free-fractions prepared from the L5178Y lymphoma (originally isolated from DBA/2 mice) and challenged with live tumor cells. Cell ghost fractions containing large membrane fragments exerted a much stronger and more rapid protective effect than other fractions. Fractions with small membrane fragments induced tumor resistance only after prolonged immunization. In H-2 incompatible mice (CBA strain) the tumor was rejected as a homograft after only one immunization because of a strong transplantation barrier. In cross reaction experiments with L5178Y-hyperimmunized DBA/2 mice challenged with the P-388 lymphoma, no protective effect was observed. Neither of the lymphomas contained a leukemia virus.

69-2593 SOME CHARACTERISTICS OF AN ISOLATED GROUP ANTIGEN COMMON TO MOST STRAINS OF MURINE LEUKEMIA VIRUS. (E.) Fink, M. A. (NCI, Bethesda, Md.), L. R. Sibal, N. A. Wivel, C. A. Cowles and T. E. O'Conner. Virology 37(4):605-614, 1969.

Group antigens of mouse leukemia viruses were studied by several methods, using an antigen prepared from Rauscher leukemia virus (RLV) and heterologous antisera to the other viruses. The results indicated the presence of an identical "g" (nucleoid) antigen in RLV and the Friend, Gross, C-60 (Manaker), Breyere-Moloney, Rich and Herbut viruses, and probably also in the Kaplan (radiation-induced leukemia), Moloney and AKR viruses. The Buffett virus seemed to have a different "g" antigen, but a reaction of partial identity was noted in immunodiffusion tests. The identity of the "g" antigens of RLV and the Herbut virus (obtained from mice inoc. with human leukemic material) indicated that the genome of the Herbut virus is of mouse virus origin.

69-2594 ANTIGENIC PROPERTIES OF A "GRAFFI" PSEUDOTYPE OF MOUSE RHABDOMYOSARCOMA VIRUS (MSV). (Fr.) Oppenheim, E. (St. Louis Hosp., Paris), J.-P. Levy and J.-C. Leclerc. C.R. Acad. Sci. [D] (Paris) 268(3):620-623, 1969.

Cells of the P-25 hamster tumor, induced by the incomplete mouse rhabdomyosarcoma virus (MSV) with an envelope furnished by the Moloney leukemia virus (M-MSV), when cocultivated with embryonic C57BL/6 mouse fibroblasts and superinfected with the Graffi mouse leukemia virus (GLV), yielded a new MSV pseudotype (designated Gi-MSV). When Gi-MSV-containing cells were inoc. s.c. into 5-day-old mice, the results demonstrated that the Gi-MSV pseudotype was better adapted to the C57BL/6 strain than to the other strains studied (BALB/c, C3H/eb, AKR and Swiss). The absence of a cross-neutralization reaction between mouse antisera to Gi-MSV and M-MSV, demonstrated that GLV is antigenically distinct from mouse leukemia viruses of the Moloney-Rauscher-Friend group. The results also showed that the specific antigens of the leukemic cells are distinct from the viral neutralizing antigens.

69-2595 SPECIFIC RESISTANCE TO THE TRANSPLANTATION OF TUMORS INDUCED BY HARVEY MSV. (It.) Koldovsky, P. (Inst. Exp. Biol. Genet., Czech. Acad. Sci., Prague), A. Turano and G. Fadda. Boll. Ist. Sieroter. Ital. 47(11-12):660-662, 1968.

In female C57BL/6 mice, pretreated with kidney and spleen homogenates from non-tumor-bearing mice of the same strain, s.c. inoc. of cells of the second passage of a tumor induced in C57BL/6 or Balb/C mice by Harvey mouse sarcoma virus (HSV) resulted in tumor takes in 6/6 animals. In mice previously immunized with subliminal doses of embryonal C57 BL/6 cells transformed by HSV in vitro, inoc. of the HSV-induced tumor resulted in tumor takes in only 1/10 animals. No tumor takes were seen in 4 mice which were immunized previously by homogenates of HSV-tumor tissue derived from Swiss mice; in 8 mice immunized with embryonal Balb/C cells transformed by HSV in vitro; in 9 mice immunized with centrifuged culture medium from HSV-infected embryonal C57BL/6 or Balb/C cell cultures; or in 7 mice previously inoc. with Moloney leukemia virus. A specific tumor antigen was apparently involved. The results appeared to support the theory that HSV is actually a mutant form of the Moloney leukemia virus.

69-2596 PATHOGENESIS OF CHRONIC FRIEND DISEASE IN HYBRID BDF$_1$ MICE. (E.) Dawson, P. J. (U. Oregon Sch. Med., Portland) and A. H. Fieldsteel. Cancer Res. 29(6): 1206-1211, 1969.

Inoc. of Friend leukemia virus (FLV) into 7-wk.-old female BDF$_1$ hybrid mice (offspring of resistant C57BL/6 females and susceptible DBA/2 males) induced a fatal disease in 93% of 180 mice. A remission period was noted at 4-8 wk. after FLV inoc. These mice, in contrast to mice of susceptible strains (such as BALB/c), showed a chronic disease with 4 histological phases (proliferative, regressive, minimal focal involvement in apparently healthy mice without significant splenomegaly, and advanced, ultimately fatal leukemia); the last 4 survivors (sacrificed 492 days after FLV inoc.) showed acute splenomegaly of short duration, and 3/4 showed histological signs of Friend disease. Typical "Friend cells" were common in the peripheral blood in all phases except the minimal focal phase; no FLV was recoverable from the spleen during this phase, or from mice not developing the disease.

69-2597 EFFECT OF FRIEND LEUKEMIA VIRUS INFECTION UPON POLYCYTHEMIA AND δ-AMINOLEVULINIC ACID SYNTHETASE ACTIVITY IN MURINE SPLEEN AND LIVER. (E.) Ebert, P. S. (NCI, Bethesda, Md.), M. A. Chirigos, P. A. Ellsworth and G. I. Malinin. Life Sci. 8(4,Pt.2):147-156, 1969.

A polycythemic response was observed after i.p. inoc. of Friend polycythemia-inducing virus into 4-6-wk.-old BALB/c mice; increased reticulocytosis was seen by 14 days after inoc., and by day 21 the RBC, Hb and hematocrit had increased. The activity of spleen δ-aminolevulinic acid synthetase (corrected for organ wt.) increased 20-fold, but liver activity of this enzyme decreased.

69-2598 RADIOSENSITIVITY AND GROWTH OF FRIEND LEUKEMIA VIRUS STUDIED WITH THE SPLEEN FOCUS ASSAY METHOD. (E.) Axelrad, A. A. (Ontario Cancer Inst., Toronto, Canada) and S. Thomson. Int. J. Cancer 4(2):179-193, 1969.

A spleen focus-forming strain of Friend virus was extracted from the spleens of Sandox inbred mice (SIM/McK) 10-20 days after infection. The D_{10} (dose required to reduce the survival of spleen focus-forming activity to 10% of the non-irradiated control value) for UV irradiation was 4.8 X 10^3 ergs/mm^2 while that for ^{60}Co γ-irradiation was 5.6 X 10^4 rads. Similar results were observed with virus isolated from plasma. Immediately after inj. of a high dose, 2-3% of the virus inoculum reached the spleen; the level fell off quickly thereafter, reaching a minimum at 16 hr. The conc. increased exponentially (doubling time of 4-6 hr.) until day 5, then remained constant for at least 18 days. Plasma virus conc. paralleled that of the spleen. Recoverable virus titers were markedly reduced by supralethal irradiation of the mice, immediately before or after viral infection.

69-2599 IMMUNOSUPPRESSION BY LEUKEMIA VIRUSES. II. CYTOKINETICS OF APPEARANCE OF HEMOLYSIN-FORMING CELLS IN INFECTED MICE DURING THE ANAMNESTIC RESPONSE TO SHEEP ERYTHROCYTES. (E.) Ceglowski, W. S. (Temple U. Sch. Med., Philadelphia, Pa.) and H. Friedman. J. Immun. 102(2):338-346, 1969.

When adult BALB/c mice were primed with sheep RBC, then inoc. with Friend leukemia virus (FLV) before a second inj. of the same antigen, the number of hemolysin-producing cells in the spleen was markedly reduced. The greatest immunosuppression was observed when FLV was inoc. 3 or 8 days before the second immunization. Because most of the serum antibody was resistant to treatment with 2-mercaptoethanol, it is concluded that most of the antibody was 7S IgG.

69-2600 QUANTITATION AND ULTRASTRUCTURE OF IMMUNODEPRESSION IN MURINE VIRUS-INDUCED LEUKEMIA. (E.) Siegel, B. V. (U. Oregon Sch. Med., Portland), G. H. Neher and J. I. Morton. Lab. Invest. 20(4):347-352, 1969.

In BALB/c mice, cellular and humoral immune responses to sheep RBC were markedly depressed in the early stages of Rauscher leukemia virus (RLV) infection. This immunodepression did not affect the development of the leukemia, the ultrastructural characteristics of single spleen plaque-forming cells, or the frequency of Type A virus-like particles. No Type A particles were seen budding at the surface of the antibody-producing cells. It is suggested that RLV-induced immunosuppression may result from a mutually exclusive competition between the antigen and the RLV for a common precursor cell.

69-2601 FURTHER IMPLICATION OF MURINE LEUKEMIA-LIKE VIRUS IN THE DISORDERS OF NZB MICE. (E.) Mellors, R. C. (Cornell U. Med. Coll., New York, N. Y.), T. Aoki and R. J. Huebner. J. Exp. Med. 129(5):1045-1062, 1969.

Mouse leukemia-like virus group antigens were commonly found in spleen, kidney and thymus tissues of NZB mice during most of their life span. The soluble antigen of Gross leukemia virus (GLV) was first observed in plasma at age 2-3 mo., the prevalence reached 100% at age 7-9 mo., then decreased to 0% at age 18 mo. Proteinuria, (indicating the development of membranous glomerulonephritis) was observed during the stages of elimination of this antigen. It is suggested that GLV plays a role in the etiology of the autoimmune hemolytic disease, membranous glomerulonephritis and malignant lymphoma of NZB mice.

69-2602 ACTIVITIES OF WATER-SOLUBLE AND LIPID-BOUND LIVER CATALASE IN STRAIN CC57BR MICE WITH VIRUS-INDUCED HEMOCYTOBLASTOSIS-RETICULOSIS. (Rus.) Koniukhov, A. F. (Inst. Exp. Clin. Oncol., Acad. Med. Sci. USSR, Moscow) and N. P. Mazurenko. Biull. Eksp. Biol. Med. 66(12):83-85, 1968.

CC57BR mice, inoc. with Mazurenko virus at age 10-15 days, died with disseminated leukemia after 3-3.5 mo. In the preterminal stages, hepatic activities of water-soluble and lipid-bound catalase were reduced to 20% of normal values. Cells obtained from mice with advanced leukemia, inoc. into mice of the same strain (15-20 g), induced leukemia which was fatal after 7-8 days; in the livers of these mice, levels of both types of catalase fell to 50% of normal values in the preterminal stages.

69-2603 A SYSTEM OF TISSUE CULTURES FOR THE STUDY OF A MOUSE LEUKEMIA VIRUS. (E.) Sinkovics, J. G. (U. Texas M.D. Anderson Hosp. Tum. Inst., Houston), G. F. Groves, B. A. Bertin and C. C. Shullenberger. J. Infect. Dis. 119(1):19-38, 1969.

Cultures of normal spleen, thymus, and embryonic cells from TIMCO Swiss mice (with a spontaneous leukemia incidence of less than 0.5% at age 1 yr.) was carried for 3.5 yr. in Rauscher mouse leukemia virus (RLV). One cell line underwent transformation to a cell causing myxofibrosarcomas, but not leukemia, in newborn mice. Virus-neutralizing antibodies were more effective against the tissue culture line virus than against mouse passage line virus. Newborn and suckling mice inoc. with tissue culture line virus developed runt disease, followed by lymphoma and a hemorrhagic disease consisting of anemia and thrombocytopenia. It is concluded that the RLV was probably attenuated in long-term culture to forms eliciting various reactions of hematopoietic cells in mice; most of these conditions regress, with a resulting immunity to virulent RLV.

69-2604 HETEROTRANSMISSION INTO HAMSTERS OF AVIAN MYELOBLASTOSIS VIRUS (AMV). (Fr.) Lacour, F. (Gustave-Roussy Inst., Villejuif, France), E. Delain, G. Camus and F. May-Levin. C.R. Acad. Sci. [D] (Paris) 268(3): 631-634, 1969.

Virogenic cells, obtained from the peripheral blood of brown Leghorn chicks (J. Carr strain) with leukemia induced by avian myeloblastosis virus (AMV; BAI strain A), were inoc. i.p. into a group of 17 48-hr.-old IGR strain albino hamsters. One animal developed a tumor, characterized by ascites, hepatosplenomegaly and kidney nodules (but without lymphadenopathy). Ascites cells from this tumor, inoc. i.p. into 1-, 5- or 20-day-old hamsters, induced tumors (characterized by histiocytic infiltration of the liver, kidneys and bone marrow, myeloid cells in the ascitic fluid and peripheral blood, and nodules of the ovaries or seminal vesicles) in 21/21 hamsters. This hamster tumor (designated HP) was transmissible to hamsters by inoc. of tumor cells, but not by inoc. of cell-free preparations. The HP cells contained virus particles, which were identical to AMV in complement fixation tests. Inoc. of HP cells alone induced no tumors in newly hatched or 4-day-old chicks. When HP cells were cocultivated with chick embryo cells (to unmask the AMV genome) prior to inoc. into 4-5-day-old chicks, 1/17 chicks developed myeloid leukemia and 3/17 developed nephroblastomas. The nephroblastomas, which were transmissible to chicks by inoc. of cell-free preparations, contained AMV particles (as demonstrated by immuno-precipitation and complement fixation tests). The stock strain of IGR albino hamsters, and the spontaneous tumors developing in these hamsters, showed no signs of infection by any avian leukosis virus. This is believed to be the first report of tumor induction by AMV in mammals.

69-2605 SOME PROPERTIES OF AMINO ACID-ACCEPTOR RNA ISOLATED FROM AVIAN TUMOUR VIRUS BAI STRAIN A (AVIAN MYELOBLASTOSIS). (E.) Trávniček, M. (Inst. Org. Chem. Biochem., Prague). Biochim. Biophys. Acta 182(2):427-439, 1969.

A method for the preparation of a low molecular wt. fraction of the viral RNA of BAI strain A avian myeloblastosis virus with amino acid-acceptor activity (which seemed to be an integral part of the virus particles) is described. The viral transfer RNA (tRNA) was an integral part of the virus particles. Viral tRNA was similar to cellular tRNA with respect to sedimentation characteristics and gel filtration behavior; it accepted 14/15 amino acids tested (except glutamic acid).

69-2606 TRANSFORMATION OF CHICK FIBROBLAST CULTURES WITH AVIAN MYELOBLASTOSIS VIRUS. (E.) Moscovici, C. (VA Admin. Hosp. Gainesville, Fla.), M. G. Moscovici and M. Zanetti. J. Cell. Physiol. 73(2):105-108, 1969.

Two strains of avian myeloblastosis virus (AMV), standard AMV (BAI strain A) and AMV with subgroup B only, were capable of transforming cell cultures of muscle tissue from chick embryos or 1-day-old chicks. The cell phenotype C/O was susceptible to AMV subgroups A and B, while phenotype C/A was susceptible to subgroup B only. The C/O cells produced A and B virus, while C/A cells produced B virus only.

69-2607 VIRAL-CELLULAR RELATIONSHIPS IN AVIAN LEUKEMIAS AND TUMORS. (Fr.) De-Thé, G. (Res. Ctr. Norm. Cancer Cells, Nat. Ctr. Sci. Res., Villejuif, France). Nouv. Rev. Franc. Hemat. 8(6):769-792, 1968.

Peripheral blood cells from leukemia induced by avian myeloblastosis virus (AMV) in chicks doubled in number every 78 hr. in vitro and showed large numbers of virus particles within intracytoplasmic formations ("gray bodies" or "viroplasts") of lysosomal nature (phagocytizing AMV particles introduced into the cell). Viral maturation began just below the cell membrane;

the AMV envelope developed from the cell membrane. Some AMV-induced renal tumors (in young chicks) showed all the morphological elements of a normal kidney cell, while others contained cartilaginous nodules, sarcomatous tissue, or even bony formations. Podocytes produced a large number of virus particles but tubule cells produced none. The AMV envelope contained elements of cellular origin, including cartilaginous fibrils and mucopolysaccharides. The envelopes of AMV particles produced in ovarian and bone tumors, sarcomas and hepatic lymphomas also reflected the origin of the viral envelope in the cell membrane. In some chicks, AMV did not transform cells of the liver and pancreas, despite its demonstrable multiplication in these tissues. In other chicks, the cell population of the thymus was replaced by giant cells which divided infrequently, within which the virus multiplied, although the thymus showed no increase in vol. or any evidence of malignancy.

69-2608 STUDIES OF AVIAN LEUKOSIS GROUP-SPECIFIC COMPLEMENT-FIXING SERUM ANTIBODIES IN PIGEONS. (E.) Sarma, P. S. (NIH, Bethesda, Md.), Log, Tze-Siung, R. J. Huebner and H. C. Turner. Virology 37(3):480-483, 1969.

Complement-fixing (CF) antibodies, induced in pigeons by inj. of a high-titer strain of Schmidt-Ruppin Rous sarcoma virus (RSV), were group-specific for avian leukosis viruses. They served as well as hamster CF antibodies in the COFAL test (not described). Pigeons infected with RSV also developed virus-neutralizing antibodies in the serum. Little infectious RSV was found in cultured pigeon tumor cells, but contact with chicken cells released RSV both in vivo and in vitro. The nonproductive interaction of RSV with pigeon cells, and the in vitro resistance of pigeon embryo fibroblasts to RSV, indicated that pigeons are similar to hamsters and other mammals in their comparative resistance to tumor induction by RSV.

69-2609 EVIDENCE FOR THE POSSIBLE EXISTENCE OF TWO ENVELOPE ANTIGENIC DETERMINANTS AND CORRESPONDING CELL RECEPTORS FOR AVIAN TUMOR VIRUSES. (E.) Bauer, H. (Max-Planck Inst., Tubingen, Germany) and T. Graf. Virology 37(1):157-161, 1969.

A new sarcoma virus was isolated from hamster cells transformed by the Schmidt-Ruppin strain of Rous sarcoma virus (SR-RSV) and inoc. into 6-wk.-old chickens of a leukosis-free strain. Tumors developed at the inoc. site; the A virus isolated transformed C0, CA and C/B type chick fibroblasts and was designated SR-RSV-H. SR-RSV-H-transformed chick fibroblasts, induced solid tumors in newborn mice, rats and hamsters, and hemorrhagic cysts in rats. Plating efficiency experiments showed that subgroup B viruses (RAV-2 and MAV-B) interfered with SR-RSV-H, but subgroup A virus (RAV-1) did not. Cross neutralization experiments showed a cross-reaction with B viruses (neutralized by chicken but not rabbit antisera), and no cross-reaction with subgroup A viruses. The existence of an antigen (designated x') responsible for the partial cross neutralization is postulated. It is suggested that the envelopes of SR-RSV-H and B viruses contain 2 antigenic envelope determinants, 1 of which is subgroup-specific and the other type-specific.

69-2610 IMMUNOLOGICAL CHARACTERISTICS OF A VIRUS INDUCING RESISTANCE TO ROUS VIRUS IN CHICK EMBRYO CULTURES. (Rus.) Kuznetsov, O. K. (Petrov Res. Inst. Oncol. USSR Min. Pub. Health, Leningrad) and A. M. Diad'kova. Vop. Onkol. 15(2):52-57, 1969.

A new virus, designated LVKL (latent chicken leukosis virus), belonging to either group A or group B of the avian leukosis viruses, was isolated from a chick embryo cell line resistant to Rous sarcoma virus (RSV). LVKL was antigenically different from RAV-1 and from the Bryan, Schmidt-Ruppin, D-5, D-6 and Carr strains of RSV.

69-2611 IN VITRO DEMONSTRATION OF TUMOR-SPECIFIC ANTIGENS IN SPONTANEOUS MAMMARY TUMORS OF MICE. (E.) Heppner, G. H. (U. Washington Sch. Med., Seattle) and G. Pierce. Int. J. Cancer 4(2):212-218, 1969.

Immune lymphocytes from autochthonous hosts caused significant inhibition (22-96%) of excised mammary adenocarcinomas which had developed spontaneously in breeding BALB/cfC3H mice, as demonstrated by the colony inhibition assay. Two different types of tumor-specific antigens were apparently present in the spontaneous mammary tumors; 1/2 common to all such tumors, the other tumor type-specific.

69-2612 INTERFERENCE OF LEUKEMOGENESIS BY MAMMARY TUMORIGENESIS IN A COLONY OF AKR MICE. (E.) Shisa, H. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan), Y. Nishizuka, T. Sakakura, H. Miyawaki and K. Nakakuki. Gann 60(2):227-230, 1969.

In a colony of AKR mice, kept in the same room as mice of the mammary tumor virus (MTV)-positive C3H/HeMs and A/Jax strains for 9 yr., the leukemia incidence in the first 10 breeding generations was 83.8%. Most of these leukemias were of the thymic lymphocytic type. Some breeding females in generations 14-22 developed mammary tumors. The viral origin of both tumor types was confirmed by several experiments. In generations 17-22, in which mammary tumors developed in 11.8% (generation 17) to 44.4% (generation 19) of the breeding AKR females, the leukemia incidence (both sexes) fell to 37.5%, with an increasing proportion of non-thymic, Hodgkin's-like lymphomas. It is suggested that propagation of a potent MTV (either activated and spread by unknown means, or accidentally transmitted from mice of the MTV-positive strains), into some mice of this AKR colony, interfered with the development of leukemia. The level of this presumably immunological interference (animal, cellular and/or viral) was unknown. In another colony of AKR mice, kept in another room, the leukemia incidence in generations 1-5 was 86.9%. Mice of these 2 AKR colonies were equally susceptible to leukemogenesis by 7,12-dimethylbenzanthracene (DMBA) or Gross (passage A) leukemia virus (GLV), but reciprocal transplantation of DMBA- or GLV-induced leukemias between mice of these 2 AKR colonies gave negative results.

69-2613 PROPERTIES OF THE IN VITRO SOLUBLE RNA METHYLASE ACTIVITY OF HAMSTER TUMORS INDUCED BY ADENOVIRUS-12. (E.) McFarlane, E. S. (Dalhousie U., Halifax, Canada). Canad. J. Microbiol. 15(2):189-192, 1969.

Adenovirus type 12-induced tumors from neonatally inoc. hamsters contained transfer RNA (tRNA) methylases which differed from those of hamster liver and connective tissue with respect to substrate specificity, response to the presence of ammonium ion, pH optima and stability on storage. The increased tRNA methylase activity in tumor extracts was not related to the tumor (T) antigen of these tumors.

69-2614 SYNTHESIS OF DEOXYRIBONUCLEIC ACID IN HUMAN AND HAMSTER KIDNEY CELLS INFECTED WITH HUMAN ADENOVIRUS TYPES 5 AND 12. (E.) Takahashi, M. (U. Osaka, Suita-City, Japan), T. Ogino, K. Baba and M. Onaka. Virology 37(4):513-520, 1969.

In human and hamster kidney cells productively infected by adenovirus type 5, and in human kidney cells productively infected with adenovirus type 12 (AV-12), cellular DNA synthesis was not immediately shut off. In hamster kidney cells abortively infected by AV-12, viral DNA was synthesized in small amounts at an early stage of infection, while cellular DNA synthesis was stimulated.

69-2615 INDUCTION EXPERIMENTS WITH ADENOVIRUS AND POLYOMA VIRUS TRANSFORMED CELL LINES. (E.) Burns, W. H. (Harvard Sch. Med., Boston, Mass.) and P. H. Black. Int. J. Cancer 4(2):204-211, 1969.

The production of infectious virus by cells of several lines (hamster, mouse or rat embryo) transformed by adenovirus types 2 and 12 and polyoma virus, could not be induced by several methods used to induce the production of SV40 in SV40-transformed cell lines (cocultivation and fusion of transformed cells with indicator cells; treatment of the heterokaryons and transformed cells with mitomycin C; passage of the cell lines through animals or in the presence of 5-bromo-2'-deoxyuridine). Even though the complete genomes may be present in at least some of these polyoma- and adenovirus-transformed cells, these genomes were not as readily reactivated as the SV40 genome in SV40-transformed cells.

69-2616 DECREASED INTERFERON SENSITIVITY AND PRODUCTION IN CELLS TRANSFORMED BY SV40 AND OTHER ONCOGENIC AGENTS. (E.) Brailovsky, C. A. (Cancer Res. Inst., CNRS, Villejuif, Val de Marne, France), L. D. Berman and Ch. Chany. Int. J. Cancer 4(2):194-203, 1969.

Permanent, genetically transmitted changes in the sensitivity to vesicular stomatitis virus (Indiana strain) were produced during SV40-induced neoplastic transformation of primary rat embryo fibroblast cell lines. This increased sensitivity probably resulted from decreased interferon production and interferon sensitivity. This phenomenon was also observed in cell lines transformed by 3-methylcholanthrene.

69-2617 GLYCOPROTEIN DEGRADATION. GLYCOSIDASES IN FIBROBLASTS TRANSFORMED BY ONCOGENIC VIRUSES. (E.) Bosmann, H. B. (U. Rochester, N. Y.). Exp. Cell Res. 54(2):217-221, 1969.

Activities of 7 glycosidases were higher in 5 mouse fibroblast cell lines transformed by SV40 or polyoma viruses, than in control non-transformed fibroblast cultures. Accelerated catabolism of the carbohydrate portion of glycoproteins was also observed. The most active glycosidase studied was N-acetyl-β-D-glucosaminidase.

69-2618 GROWTH PATTERNS OF NORMAL AND POLYOMA VIRUS-TRANSFORMED EMBRYONAL RAT AND HAMSTER TISSUE CULTURES. (Rus.) Parkhomenko, I. I. (Inst. Chem. Physics USSR Acad. Sci., Moscow), I. S. Irlin and N. P. Konovalova. Vop. Onkol. 15(2):47-52, 1969.

Uninfected cultures of embryonal rat and hamster cells could be passaged only 6-7 times. After polyoma virus infection, 2.5% of the hamster cells and 1.8% of the rat cells showed malignant transformation. The proportion of transformed cells increased to 45.6-69.8% in passages 3-4 and to 100% in passages 8-9. Cloning efficiency also increased from 1 passage to the next.

69-2619 THE ACTIVATION OF VIRUS SYNTHESIS IN POLYOMA-TRANSFORMED CELLS. (E.) Fogel, M. (Weizmann Inst. Sci., Rehovoth, Israel) and L. Sachs. Virology 37(3):327-334, 1969.

When rat embryo muscle cell cultures were infected with a small plaque (SP) and a large plaque (LP) strain of polyoma virus (PV) and clones were isolated from the transformed cell lines in the presence of anti-PV antiserum, no virus synthesis was detectable in 30 SP-transformed clones, but virus synthesis was noted in 92/100 LP-transformed clones. The synthesized virus was of the LP type. This spontaneous activation of LP virus synthesis was observed in about 1 in 10^4 cells. A 100-fold increase in the number of virus-synthesizing cells in spontaneously activated clones was obtained after X-irradiation, and in the multinucleate cells formed after fusion of LP-transformed and normal mouse cells with Sendai virus.

69-2620 EFFECT OF IRRADIATION AND NEONATAL THYMECTOMY ON THE GROWTH OF POLYOMA TUMORS IN RABBITS. (Rus.) Irlin, I. S. (Gamaleya Inst. Epidem. Microbiol., Moscow) and V. S. Ter-Grigorov. Vop. Onkol. 15(2):42-46, 1969.

Lymphocytic infiltration, resembling an allograft reaction, was noted in regressing tumors induced by neonatal polyoma virus (PV) infection in rabbits. Neonatal thymectomy or treatment with X-rays (at age 3 wk.) did not affect the frequency or the initial growth patterns of PV-induced tumors in neonatally infected rabbits, but a large proportion of these tumors grew progressively and failed to regress. The immunomorphological reaction in these progressive tumors was greatly reduced or absent. It is concluded that regression of PV-induced tumors in rabbits is related to the development of delayed-type hypersensitivity.

69-2621 STIMULATION OF VIRUS CARCINOGENESIS BY FREUND'S ADJUVANT. (Rus.) Ter-Grigorov, V. S. (Gamaleya Inst. Epidem. Microbiol., Moscow), I. S. Irlin, E. I. Tsysina and T. I. Biriulina. Vop. Onkol. 15(3):53-58, 1969.

CC57BR mice proved highly resistant to polyoma virus (PV) carcinogenesis. When a dose of PV which did not cause cancer in control experiments, was applied in Freund's adjuvant (FA), typical PV tumors developed in 74% of the mice, with a latent period of only 2.5 mo. FA had a similar effect in rats inoc. with Rous sarcoma virus; the tumor incidence was 100% with FA, compared to 30-40% in controls. Since FA stimulated the immune response (especially humoral antibody formation), it is suggested that the enhancing (protective) antibodies reach the transformed cells sooner than the immune cells in FA-treated animals.

69-2622 INTERACTION BETWEEN PERIPHERAL BLOOD LEUCOCYTES AND X-IRRADIATED CELLS FROM LYMPHOID CELL LINES. (E.) Hardy, D. A. (U. Birmingham, England), N. R. Ling and S. C. Knight. Experientia 25(4):404-406, 1969.

Three human lymphoma cell lines (EB-2, EB-4 and EB-5) and 4 normal human lymphoid cell lines (NHDL-1, NHDL-2, NHDL-3 and NHDL-4) showed a marked decrease in DNA synthesis after exposure to X-rays (6000 r) in static suspension cultures. When these irradiated cells were mixed with peripheral lymphocytes from normal donors in short-term cultures, marked activation of DNA synthesis was noted in all cultures. Frozen and thawed or preserved human lymphocytes did not activate DNA synthesis. Marked quantitative variations in the degree of activation of DNA synthesis by lymphocytes from different subjects were noted. Since no continuous proliferation of the normal cells was noted under these conditions, and since the activation reaction took place in all cell lines irrespective of the presence or absence of herpes-type virus (present in EB-2, NHDL-1, NHDL-2 and NHDL-4; absent in NHDL-3; undetermined in EB-4 and EB-5), it is suggested that this activation effect was probably not virus-dependent, although the involvement of a virus or virus product could not be excluded. The reaction seemed to depend on recognition of foreign antigens on the continuously cultured cells by the normal lymphocytes.

69-2623 THE INHIBITORY EFFECT OF CERTAIN ARBOVIRUSES ON SHOPE FIBROMA FORMATION. (E.) Takehara, M. (Kobe U. Sch. Med., Japan), S. Makino and S. Hotta. Acta Virol. (Praha)[Eng.] 13(1):34-41, 1969.

The appearance and development of skin fibromas, induced by Shope fibroma virus (SFV) in rabbits, was inhibited when certain arboviruses (Western equine encephalitis, Japanese encephalitis and dengue, in order of decreasing effect) were individually mixed with SFV just before inj. A lesser degree of inhibition was seen when the arbovirus was inj. shortly before or after SFV inj.; no inhibition was seen with an interval of 5 days or more. The inhibitory action seemed to result from a local interference between the arbovirus and SFV.

69-2624 VIRUS IDENTIFICATION IN CYTOLOGIC AND HISTOLOGIC MATERIAL BY ELECTRON MICROSCOPY. (E.) Takeda, M. (U. Saskatchewan, Saskatoon, Canada). Acta. Cytol. (Balt.) 13(4):206-209, 1969.

69-2625 ASSAY OF WOUND TUMOR VIRUS BY THE FLUORESCENT CELL COUNTING TECHNIQUE. (E.) Chiu, Ren-Jong (U. Illinois, Urbana) and L. M. Black. Virology 37(4):667-677, 1969.

69-2626 ISOLATION AND SOME CHARACTERISTICS OF A GROUP-SPECIFIC ANTIGEN OF THE MURINE LEUKEMIA VIRUSES. (E.) Gregoriades, A. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.) and L. J. Old. Virology 37(2):189-202, 1969.

69-2627 DEMONSTRATION OF GRAFFI VIRUS-INDUCED SURFACE ANTIGENS OF LEUKEMIA CELLS BY INDIRECT IMMUNOFERRITIN TECHNIQUE. (E.) Micheel, B. (German Acad. Sci., Berlin-Buch) and D. Bierwolf. Exp. Cell Res. 54(2):268-271, 1969.

69-2628 ISOLATION OF NATURALLY OCCURRING VIRUSES OF THE MURINE LEUKEMIA VIRUS GROUP IN TISSUE CULTURE. (E.) Hartley, J. W. (NIH, Bethesda, Md.), W. P. Rowe, W. I. Capps and R. J. Huebner. J. Virol. 3(2):126-132, 1969.

69-2629 DIFFERENCES IN ACTINOMYCIN D SENSITIVITY BETWEEN PATHOLOGICAL TISSUE INDUCED BY THE FRIEND VIRUS AND NORMAL ERYTHROPOIETIC TISSUE. (Fr.) Wendling, F. (Inst. Radium, Orsay, France), P. Tambourin, N. Barat and F. Zajdela. C. R. Acad. Sci. [D] (Paris) 268(17):2222-2225, 1969.

69-2630 HOMOLOGY BETWEEN THE RNA OF RAUSCHER LEUKEMIA VIRUS AND CERTAIN SPECIFIC FRACTIONS OF HOST CELL DNA. (Fr.) Emanoil-Ravicovitch, R. (St. Louis Hosp., Paris), C.-J. Larsen and M. Boiron. C. R. Acad. Sci. [D] (Paris) 268(17):1137-1140, 1969.

69-2631 EXPERIMENTAL INVESTIGATIONS IN MURINE LEUKEMIA. NOTE XIII. THE EVOLUTION OF INFECTION WITH C57 VIRUS IN ALBINO MICE TREATED WITH INDIA INK. (E.) Nastac, E. ("St. S. Nicolau" Inst. Inframicrobiol., Bucharest), M. Lungu, G. Balmus, M. Hozoc, M. Stoian, E. Ciufecu and D. Winter. Rev. Roum. Inframicrobiol., 5(4):289-298, 1968.

69-2632 EXPERIMENTAL INVESTIGATIONS IN MURINE LEUKEMIA. NOTE XIV. ACTION IN VIVO OF NUCLEOPROTEIN EXTRACTS AND TISSUE FILTRATES FROM MICE WITH LEUKEMIA INDUCED BY C-57 VIRUS AFTER ADMINISTRATION OF INDIA INK. (E.) Nastac, E. ("Şt. S. Nicolau" Inst. Inframicrobiol., Bucharest), M. Lungu, M. Hozoc, G. Balmuş, E. Ciufecu, I. Samuel and D. Winter. Rev. Roum. Inframicrobiol. 6(1):37-41, 1969.

69-2633 TUMOR DEVELOPMENT AND INDUCTION OF RESISTANCE BY ROUS SARCOMA VIRUS IN JAPANESE QUAIL. (E.) Yamanouchi, K. (Nat. Inst. Health, Tokyo), M. Hayami, A. Fukuda and F. Kobune. Jap. J. Med. Sci. Biol. 21(6):393-404, 1968.

69-2634 GERIATRIC INFECTIOUS MONONUCLEOSIS: REPORT OF A CASE WITH EPSTEIN-BARR VIRUS ANTIBODIES. (E.) Golden, R. L. (554 Larkfield Rd., East Northport, N. Y.). J. Amer. Geriat. Soc. 17(4):426-428, 1969.

69-2635 HERPESLIKE VIRUS ISOLATED FROM SPONTANEOUSLY DEGENERATED TISSUE CULTURE DERIVED FROM LEUKEMIA-SUSCEPTIBLE GUINEA PIGS. (E.) Hsiung, G. D. (VA Hosp., West Haven, Conn.) and L. S. Kaplow. J. Virol. 3(3):355-357, 1969.

69-2636 VIRUSES AND RENAL CARCINOMA OF Rana pipiens. VIII. ELECTRON MICROSCOPIC EVIDENCE FOR THE PRESENCE OF HERPESVIRUS IN THE URINE OF A LUCKÉ TUMOR-BEARING FROG. (E.) Granoff, A. (U. Tennessee Med. Units, Memphis) and R. W. Darlington. Virology 38(1):197-200, 1969.

69-2637 SPECIFIC TUMOUR ANTIGEN INDUCED BY CHICK EMBRYO LETHAL ORPHAN (CELO) VIRUS. (E.) Potter, C. W. (U. Sheffield, England) and J. S. Oxford. J. Gen. Virol. 4(Pt.2):287-289, 1969.

69-2638 BIOCHEMICAL STUDIES ON ADENOVIRUS MULTIPLICATION. XIV. MACROMOLECULE AND ENZYME SYNTHESIS IN CELLS REPLICATING ONCOGENIC AND NONONCOGENIC HUMAN ADENOVIRUS. (E.) Piña, M. (St. Louis U. Sch. Med., Mo.) and M. Green. Virology 38(4):573-586, 1969.

69-2639 ULTRAVIOLET INACTIVATION OF THE CYTOCIDAL AND TRANSFORMING ACTIVITIES OF HUMAN ADENOVIRUS TYPE I. (E.) Finklestein, J. Z. (Child. Hosp., Los Angeles, Calif.) and R. M. McAllister. J. Virol. 3(3):353-354, 1969.

69-2640 FAILURE TO DETECT INCORPORATION OF HOST CELL DNA INTO VIRIONS OF ADENOVIRUS TYPE 12. (E.) Zur Hausen, H. (U. Wurzburg, Germany). Virology 38(1):194-197, 1969.

69-2641 TRANSFORMATION OF DOG KIDNEY CELLS INFECTED WITH SV40 AND SV40-ADENO 7 HYBRID VIRUS. (E.) Vonka, V. (Res. Inst. Immun., Prague), L. Kutinová and H. Závadová. Acta Virol. (Praha) [Eng.] 13(1):1-7, 1969.

69-2642 COMPARATIVE STUDY OF SV40 VIRUS MULTIPLICATION IN VARIOUS MAMMALIAN CELL CULTURES. (E.) Sahnazarov, N. ("St. S. Nicolau" Inst. Inframicrobiol., Bucharest), I. Aderca and Iftimovici. Rev. Roum. Inframicrobiol. 6(1):57-63, 1969.

9-2643 INTERACTION BETWEEN SV40 AND OTHER VIRUSES IN TISSUE CULTURE: INTERFER-
NCE AND DOUBLE INFECTION. (E.) Altstein, A. D.
L. A. Tarassevich State Control Inst. Med. Biol.
rep., Moscow), N. N. Dodonova, G. A. Nadtochey
nd A. F. Bykovski, Arch. Ges. Virusforsch
8(1):7-18, 1969.

9-2644 MULTIPLICITY OF VIRAL GENOMES IN AN SV40 TRANSFORMED HAMSTER CELL LINE.
E.) Tai, H. T. (U. South. California Sch. Med.,
os Angeles) and R. L. O'Brien. Virology
8(4):698-701, 1969.

9-2645 ABSENCE OF REPRESSOR IN SV40-TRANSFORMED CELLS. (E.) Jensen, F. C. (Wistar
nst. Anat. Biol., Philadelphia, Pa.) and H.
oprowski. Virology 37(4):687-690, 1969.

9-2646 CHROMOSOMAL EVOLUTION OF A SECONDARY CLONE FROM THE SV40 TRANSFORMED HUMAN
ELL LINE, W18 VA2. (E.) Weinstein, D. (Wistar
nst. Anat. Biol., Philadelphia, Pa.). Exp.
ell Res. 54(2):253-255, 1969.

69-2647 SIMIAN VIRUS 40 DEOXYRIBONUCLEIC ACID REPLICATION. I. EFFECT OF CYCLOHEXIMIDE ON THE REPLICATION OF SV40 DEOXYRIBONUCLEIC ACID IN MONKEY KIDNEY CELLS AND IN HETEROKARYONS OF SV40-TRANSFORMED AND SUSCEPTIBLE CELLS. (E.) Kit, S. (Baylor U. Sch. Med., Houston, Tex.), T. Kurimura, R. A. De Torres and D. R. Dubbs. J. Virol. 3(1):25-32, 1969.

69-2648 LOSS OF SV40-INDUCED T-ANTIGEN FROM SOMATIC HYBRIDS BETWEEN MOUSE CELLS AND SV40-TRANSFORMED HUMAN CELLS. (E.) Weiss, M. C. (Carnegie Inst., Pittsburgh, Pa.). Carnegie Institution Jan.:428-429, 1969.

69-2649 CORRELATION BETWEEN THE SYNTHESIS OF DNA AND HISTONES IN POLYOMA VIRUS-INFECTED MOUSE EMBRYO CELLS. (E.) Shimono, H. (Albert Einstein Med. Ctr., Philadelphia, Pa.) and A. S. Kaplan. Virology 37(4):690-694, 1969.

69-2650 REPLICATING MOLECULES OF POLYOMA VIRUS DNA. (E.) Hirt, B. (Swiss Inst. Exp. Cancer Res., Lausanne, Switzerland). J. Molec. Biol. 40(1):141-144, 1969.

69-2651 THE STRUCTURE OF VIRUSES OF THE PAPILLOMA-POLYOMA TYPE. V. TUBULAR VARIANTS BUILT OF PENTAMERS. (E.) Kiselev, N. A. (Med. Res. Coun. Lab. Molec. Biol., Cambridge, England) and A. Klug. J. Molec. Biol. 40(2):155-169, 1969.

See also abstract nos.: 2499,2514,2718

69-2652 CANCER MORTALITY IN THE CITY OF SPLIT OVER A 10-YEAR PERIOD (1957-1966). (Ser.) Kaštelan, S. (Health Ctr., Split, Yugoslavia). Lijecn. Vjesn. 90(10):919-927, 1968.

The population of Split rose from 64,717 in 1957 to 91,475 in 1966 (the population was 49.28% male and 50.72% female in 1961). During the 10-yr. period 1957-1966, 1010 persons (520 males, 490 females) died of malignant neoplasms. The annual mortality rate/100,000 population (both sexes) from all causes was 1074 in 1957 and 1037 in 1966; cancer mortality rates were 117 and 135/100,000, resp. Cancer caused 10.9% of all deaths in 1957 and 13.0% of all deaths in 1966. During this 10-yr. period, the most frequent cancer deaths in males resulted from cancer of the lung, stomach, liver + gallbladder and urinary bladder (24.81%, 11.92%, 6.92% and 5.77% of all cancer deaths, resp.); in females, the most frequent cancer deaths resulted from cancer of the breast, uterus, liver + gallbladder, stomach, lung and intestine (17.75%, 14.90%, 11.22%, 9.18%, 5.31% and 5.10% of all cancer deaths, resp.). Leukemia caused 5.77% of all cancer deaths in males and 5.31% in females. A majority of the pts. (59.04% of the males, 59.80% of the females) were in the 60-and-over age group at death; 29.04% and 30.41%, resp., were in the 40-59 yr. age group. Only 15 males (2.88%) and 20 females (3.88%) were in the 0-19 yr. age group; in these pts., the most frequent cancer deaths resulted from leukemia (11/15 males, 7/20 females), brain tumors, bone sarcomas and ovarian tumors. No seasonal variations in the cancer death rates were noted. In 1957, 354,768 work days were recorded as lost in Yugoslavia (and 126,689 days in Croatia) because of malignant neoplasms.

69-2653 ACTIVITY OF THE TRIESTE TUMOR CENTER WITH RESPECT TO THE DETECTION OF NEOPLASMS. (It.) Marinuzzi, A. (Ctr. Diag. Treatment Tumors, Trieste, Italy). Cancro 21(3):301-312, 1968.

In 1967, 776 men and 7932 women (over 90% of them from the Trieste area, with a population of about 300,000) came to this center for diagnostic studies (67% of the group for the first time). The preponderant age groups were 51-60 yr. in the men and 41-50 yr. in the women. Malignant tumors were found in 2.96% of the men (23/776) and 1.42% of the women (93/7932). The 136 cancers seen in this group of 8708 persons comprised 10.2% of all malignant tumors reported in Trieste in 1967, including 45.5% of the cancers of the cervix (45 cases), 35.6% of the breast cancers (43 cases), 23.7% of the skin and lip cancers (26 cases) and 15.5% of the cancers of the uterus (7 cases). The value of such early detection studies was demonstrated by the fact that 45/45 cancers of the cervix were in the initial stages (18/45 in Stage 0, 21/45 in Stage I, 6/45 in Stage II). In addition, 63.7% and 55.5% of the cancers of the cervix in women aged 31-40 and 41-50, resp., and 50.0% of the breast cancers in women aged 41-50 yr., were detected by these studies.

69-2654 MORTALITY FROM MALIGNANT TUMORS IN THE REPUBLIC OF SAN MARINO. (It.) Bisbini, P. (U. Bologna, Italy), L. M. Dominici, M. R. Bigotto and G. Lombardi. Riv. Ital. Ig. 28(1-2):5-23, 1968.

Cancer mortality rates in the Republic of San Marino remained essentially constant between 1907-1947, at approx. 90/100,000 population/yr. In 1948-1956, the mean annual rate increased to 156/100,000; in 1957-59, 1960-62 and 1963-65, these rates were 188,168 and 196/100,000/yr., resp. The mean annual mortality rate during the total period 1948-1965 was 167/100,000; for all g.i. cancers and for stomach cancer alone, mean annual mortality rates were 105 and 74/100,000, resp. During this interval, annual death rates from cancer of the respiratory tract were only about 2/100,000; this rate was significantly lower than that for Italy as a whole or for the provinces immediately surrounding San Marino (18 and 19/100,000/yr., resp.). The unadjusted, absolute male:female ratio was slightly in excess of 2:1; when adjusted to the population distribution, it was 23:19. Mortality rates from cancer of the breast and uterus remained constant throughout the 18-yr. observation period; age-adjusted rates for these cancers were highest in the 55-65 yr. age group. A comparison of annual mortality rates/100,000 for specific cancers in 1908-1947 and in 1948-1965, showed a decrease in cancer of the uterus and increases in all other cancers (especially of the stomach and other g.i. organs).

69-2655 INCIDENCE OF VARIOUS DISEASES IN THE AGED. FINDINGS AND REMARKS CONCERNING A HOSPITAL STUDY GROUP. (It.) Spigliati, P. (City Hosp., Sulmona, Italy), C. De Grandis, L. Busatti and E. Conti. G. Geront. 16(8):852-854, 1968.

From January, 1961-September, 1967, 7829 pts. were seen at this hospital. This group included 1712 pts. (25%) in the 65-80 yr. age groups. In the 1079 men and 643 women aged 65-80 yr., the most prevalent diseases were myocardial sclerosis (21.14% of the men and 32.35% of the women) and bronchopulmonary diseases (10.9% and 11.19%, resp.). Malignant tumors were seen in 54/1079 men (about 5%) and 30/643 women (4.66%): primary liver cancer in 13 pts. (7 men, 6 women), genital cancer in 17 pts. (10 men, 7 women), stomach cancer in 28 pts. (22 men, 6 women) and lung cancer in 26 pts. (15 men, 11 women).

69-2656 CONTRIBUTION TO THE STUDY OF CEREBRAL METASTASES. I. ANATOMICAL-CLINICAL CORRELATIONS IN 150 CASES. (Fr.) France, L. H. (U. Geneva, Switzerland). Minerva Neurochir. 12(3):195-209, 1968.

In 1957-1960 (inclusive), cancer was found in 908/3373 autopsies (26.9%) performed at the Geneva Cantonal Hospital. Metastatic CNS tumors were found in 92 pts. (2.7% of all autopsies, 10.0% of the cancer pts.) and comprised 66.1% of the brain tumors seen during this time. Primary tumors producing CNS metastases in a high frequency of cases ("encephalophilic" tumors) included malignant melanoma (7/8 = 87.5%) and cancer of the lung (36/135 = 26.6%), breast (19/83 = 22.8%) and kidney (5/28 = 17.8%). CNS metastases were also seen in 3/10 with thyroid cancer. Primary tumors producing few CNS metastases ("encephalophobic" tumors) included cancer of the uterus (0/51), ovary (1/33), prostate (2/51), ear-nose-throat region (3/49), stomach (2/83), intestine (6/67), esophagus (2/30), pancreas (0/33) and liver and gallbladder (4/41). The records for 1954-1956 and through June, 1961 disclosed 48 additional pts. with CNS metastases. Most of these 150 pts. with CNS metastases were males (57.4%); the age range was 35-81 yr. Frequencies of CNS metastases from "encephalophilic" and "encephalophobic" tumors were comparable to those noted in 17 previously reported series. In these series of cases, 10 autopsy series and 7 series of brain tumors (previously reported), the relative frequencies of metastatic CNS tumors varied widely from 1 group to another. The author's series and these previously reported groups are compared in a set of tables.

69-2657 TUMORS OF THE CEREBRAL HEMISPHERES IN CHILDHOOD AND YOUTH. (Ger.) Grote, W. (Neurosurg. Clin., U. Bonn) and F. Römer. Z. Kinderchir. Suppl. 6:45-61, 1969.

Over a 20-yr. period, 437 children and adolescents (aged 0-16 yr.) with intracranial space-occupying lesions were seen. The lesions were subtentorial in 156/437 (35.7%) and supratentorial in 281/437 (64.3%). Malignant tumors were noted in 323/437 (74% of all space-occupying lesions); 176/323 tumors (54.5%) were supratentorial and 147/323 (45.5%) were subtentorial. Of the supratentorial tumors, 81/176 (25% of all intracranial tumors) involved the cerebral hemispheres, and 53/81 were neuroepithelial or mesodermal tumors. In this group of 53 pts., the male:female ratio was 2:1, and the number of cases increased at about the time of puberty. The distribution of histological tumor types in this series was about the same as in other reported groups, but this pt. group showed a higher frequency of temporal lobe tumors (compared to tumors of the frontal or parietal lobes) than other reported series.

69-2658 SPINAL TUMORS IN CHILDHOOD. (Ger.) Grote, W. (NeuroSurg. Clin., U. Bonn). Z. Kinderchir. Suppl. 6:62-77, 1969.

Over a 20-yr. period, 437 children with intracranial tumors and 40 children (9.1%) with spinal tumors were seen. The 40 children with spinal tumors (21 boys and 19 girls, aged 4 days-17 yr.) comprised 15.6% of the 255 pts. with spinal tumors seen during this period. The group included 8 infants (aged 4 days-1 yr.) with apparently congenital tumors, and 1 older child (aged 5 yr.) with symptoms since birth. Two of the adolescent pts. had histories of tuberculous spondylitis of about 7-9 yr. duration (before the diagnosis of the tumors).

69-2659 TUMORS OF THE NECK IN CHILDREN. (Ger.) Overbeck, W. Langenbecks Arch. Klin. Chir. 322:1207-1217, 1968.

Tumor-like swellings of the neck were found in 158/20,087 children (under 14 yr. of age) examined over 15 yr. (1952-1967) at the Freiburg University Hospital. In 104/158, the swellings were of an inflammatory nature. Tumors were noted in 54 pts. (0.25% of the entire group), including 37 benign cysts or fistulas, 13 benign tumors (10 hemangiomas, 3 lipomas or fibromas and only 4 malignant tumors (Hodgkin's disease in 3/4, sarcoma in 1/4). No cases of thyroid cancer are mentioned.

69-2660 TUMORS OF THE MEDIASTINUM IN CHILDHOOD. (Ger.) Hasse-Berlin, W. Langenbecks Arch. Klin. Chir. 322:1236-1247, 1968.

The author's group of 22 cases was added to 1169 reported cases of differentiated mediastinal tumors in children under 14. Excluding 2 children with intrathoracic struma, 34.2% of these 1189 tumors were malignant: 63% of the mesenchymal tumors, 60% of the lymph node tumors, 49% of the thymus tumors, 48% of the neurogenic tumors, 19% of the teratomas, 6% of the angiomas and 0.2% of the cysts. In the group of 350 children with neurogenic tumors, the number of malignant tumors decreased markedly with age, whereas the number of benign tumors increased to a peak at age 6-7, then fell steadily to age 14 yr.

69-2661 THYMUS TUMORS IN CHILDHOOD. (Ger.) Von Der Oelsnitz, G. Langenbecks Arch. Klin. Chir. 322:1247-1250, 1968.

Of 83 mediastinal tumors seen in children (under 14 yr. of age) at the Pediatric Surgical Clinic in Bremen, only 5 (6%) were tumors of the thymus (4/5 were thymomas and 1/5 could not be identified). Only 1/5 showed clinical evidence of an intrathoracic process. None had symptoms of myasthenia.

69-2662 PRIMARY GASTROINTESTINAL TRACT LYMPHOMA IN CHILDHOOD. (E.) Jenkin, R. D. T. (Princess Margaret Hosp. and Hosp. Sick Child., Toronto, Canada), M. J. Sonley, C. A. Stephens, J. M. M. Darte and M. V. Peters. Radiology 92(4):763-767, 1969.

In 1930-1965, 75 children (under 16 at diagnosis) with Hodgkin's disease and 121 with other malignant lymphomas (including lymphosarcoma and reticulum cell sarcoma) were seen at this hospital. Primary involvement of the g.i. tract was noted in 39/121 with lymphomas other than Hodgkin's disease (1 other tumor was later reclassified as a pseudolymphoma). The majority of these 39 children were 5-8 yr. old at diagnosis; the male:female ratio was 9:1. No primary involvement of the g.i. tract was noted in the children with Hodgkin's disease. The differences in presentation, site of involvement, tumor histology and response to therapy between the 39 children with g.i. lymphoma and adults with such tumors, led to the suggestion that g.i. lymphomas in children constitute a distinct clinical entity, in relation both to the same disease in adults and to lymphosarcoma and reticulum cell sarcoma of other primary sites in childhood.

69-2663 PRIMARY, SO-CALLED ISOLATED, HODGKIN'S DISEASE OF THE STOMACH. (Ger.) Kiessling, J. (Robert Rössle Clin., German Acad. Sci., Berlin) and G. P. Wildner. Deutsch. Z. Verdau. Stoffwechselkr. 28(5-6):295-303, 1968.

From 1949-1966, 184 pts. with Hodgkin's disease, 705 with carcinoma of the stomach and 15 with sarcomas of the stomach were seen at this hospital. One of the pts. had apparently primary Hodgkin's disease of the stomach, which was identified at surgery about 3 yr. after cholecystectomy and about 1.5 yr. after the diagnosis of diabetes mellitus and small ulcerations of the lesser curvature of the stomach.

69-2664 SEX RATIO IN HODGKIN'S DISEASE: COMPARATIVE STUDY OF STANDARDIZED MORTALITY STATISTICS. (Ger.) Dörken, H. (U. Med. Clin., Hamburg-Eppendorf, Germany). Munchen. Med. Wschr. 111(16):919-923, 1969.

Age-adjusted annual Hodgkin's disease mortality rates/100,000 (based on the 1950 U.S. white population) were standardized to obtain the sex ratios (SR; male:female ratios) for 1958. In 17 European nations the mean SR was 1.5:1, ranging from 0.9:1 in Norway and Northern Ireland, to 2.0:1 in Czechoslovakia and Finland. In West Germany (1964-1965), the SR was 1.6:1 (1.3:1 in Schleswig-Holstein, 1.4:1 in Hamburg, 1.6:1 in Niedersachsen). In 9 non-European nations the mean SR was 1.7:1, ranging from 1.0:1 and 1.1:1 in Ceylon and Canada, resp., to 2.0:1 in 3 nations (Venezuela, Australia, Japan), and 2.1:1 in Israel. SR values in the U.S. white and non-white populations were 1.5:1 and 1.9:1, resp. Previously published data for the U.S. (1953-1955; white population) showed age changes in the SR: about 3:1 at age 5-11 yr., decreasing to almost 1:1 at age 15-19, increasing to 2.3:1 at age 45-49, then decreasing again in the older age groups. Other previously published data for the U.S. (since 1923) and England + Wales (since 1911) showed that the SR for Hodgkin's disease has not changed in recent times, in contrast to the changing values in adults and children with leukemia. It is pointed out that any attempt to account for the etiology of Hodgkin's disease will have to be compatible with these data.

69-2665 MALIGNANT RENAL TUMORS IN ADOLESCENCE. (E.) Love, L. (Cook Co. Hosp., Chicago, Ill.), H. A. Neumann, P. B. Szanto and G. M. Novak. Radiology 92(4):855-860, 1969.

Pts. in the 10-20 yr. age group constitute a very small proportion of pts. with malignant tumors of the kidney (0.5% of 1 group of 1107 pts.), most of whom are in the 40-and-over age group. A survey of the literature (19 references) disclosed 52 such cases. This report concerns 1 male and 4 female adolescents (aged 14-20 yr.) with malignant tumors of the kidney (3 renal cell carcinomas, 1 nephroblastoma, 1 metastatic tumor). All of these pts. were Negro.

69-2666 PRIMARY EPITHELIAL TUMORS OF THE BLADDER IN THE FIRST TWO DECADES OF LIFE. (E.) Javadpour, N. (Armed Forces Inst. Path., Washington, D. C.) and F. K. Mostofi. J. Urol. 101(5):706-710, 1969.

From 1945-1964 (inclusive), 10,000 primary epithelial tumors of the bladder were registered at the Armed Forces Institute of Pathology; including 40/10,000 from pts. aged 6-20 yr. (36 males, 4 females; 1 Negro, 39 white); 3/40 were under 15. Histories of cigarette smoking (av. 1.5 packs/day), for 2-5 yr. (av. 3.7 yr.) before the onset of symptoms, were noted for 18/40 pts., nearly all of whom were over 14. No histories of leukoplakia or exposure to other bladder carcinogens were recorded. Only 3 urinary tract infections were noted as the presenting symptom; 1 pt. had schistosomiasis of the bladder. One pt. had an adenocarcinoma and 1 pt. (with schistosomiasis) had a squamous cell carcinoma. The other 38 tumors were of the transitional type, all in Jewett Stages 0 or A (TNM Stages X or T1); only 3/38 were infiltrative (the youngest of these 3 pts. was 12 yr.

old, apparently the youngest recorded case of this type). Five tumors were papillomas; 35/40 tumors had papillary elements. The tumors in these young pts. were histologically and clinically more benign than in older pts. A literature survey (14 references) disclosed about 12 similar cases of bladder cancer in the first 2 decades.

69-2667 BLADDER CANCER: A 26-YEAR REVIEW. (E.) Cox, C. E. (Wake Forest U., Winston-Salem, N. C.), A. S. Cass and W. H. Boyce. J. Urol. 101(4):550-558, 1969.

In 1941-1966 (inclusive), 371 pts. with bladder cancer were admitted to the hospital of the Bowman-Gray School of Medicine (Winston-Salem). The number of cases seen ranged from 0 in 1941 to 26 in 1957 (av., 14.3 cases/yr.), or 0.13% of all admissions/yr. (the av. annual number of admissions was 11,248). These frequency data were consistent with the national av. values. The number of pts. employed in textile or furniture manufacturing, or in the processing of petroleum products or tobacco, seemed to be consistent with the available industrial facilities in this hospital's predominantly rural referral area. Data on tobacco usage were not sufficient for evaluation.

69-2668 CLINICAL-STATISTICAL STUDIES OF BRONCHOPULMONARY CANCER IN THE INTERNAL MEDICINE DEPARTMENT OF HOSPITAL NO. 1, ORADEA. (Rum.) Popp, S. (Int. Med. Dept., Hosp. No. 1, Oradea, Rumania) and A. Firez. Oncol. Radiol. 7(3):265-267, 1968.

From 1961-1965 (inclusive), 30,221 pts. were seen in this hospital. Malignant tumors were noted in 898/30,221, including 198 cases of cancer of the lung and bronchus (22%). The relative frequency of lung and bronchial cancer increased from 13.2% (17/133 tumors) in 1961 to 26.4% (62/235 tumors) in 1965. The incidence/100,000 population of lung and bronchial cancer in urban residents increased from 4 in 1961 to 22 in 1965; in the rural population, the incidence increased from 1.3 to 5. In this series of 198 pts., the male:female ratio was 6:1, compared to 10:1 to 14:1 in earlier studies (no further details). Histories of pulmonary diseases, usually pneumonia or influenza, were reported by 60% of the group. Of these pts. 48% were in the 50-60 yr. age group, 30% were in the 40-50 yr. age group and 20% were over 60. In the total pt. population, 16% were non-smokers and 25.8% were heavy smokers; in the group of pts. with lung cancer, these proportions were 1.8% and 72.4%, resp.

69-2669 NOTES ON THE EPIDEMIOLOGY OF CANCER OF THE LUNG. (Por.) Teixeira, J. (Postgrad. Sch. Med., Catholic U., Rio de Janeiro, Brazil). Brasil Med. 82(6):364-367, 1968.

Autopsy records from the 4 largest hospitals of the State of Guanabara (the city of Rio de Janeiro) showed a steady increase in the frequency of lung cancer from 1919 to 1961. During the entire period, cancer was found in 1527/14,132 autopsies (10.8%) and primary lung cancer was found in 120 autopsies (0.8% of all autopsies; almost 7.9% of all cancers). The records of 2 hospitals for 1919-1927 showed 3 lung cancers (0.19% of 1531 autopsies; 2.8% of 107 cancers); records from 1 hospital for 1950-1961 showed 28 lung cancers (1.6% of 1710 autopsies; 16.0% of 175 cancers). In Rio de Janeiro, mortality coefficients (number of deaths/100,000 population) in both sexes (combined) for all cancers combined, rose from about 68 in 1940 to about 92 in 1960; during this time, the corresponding rates for lung and bronchial cancer increased from 2.0 to 10.2. This increase in respiratory cancer was particularly marked in males, although the rates for all cancers combined were about the same in both sexes. Mortality coefficients for lung and bronchial cancer in both sexes apparently leveled off during and after 1957, with plateaus at 13.3 deaths/100,000 population for males and about 3.7/100,000 for females through 1960.

69-2670 MALIGNANT BRONCHOPULMONARY TUMORS AND THE FEMALE SEX. (It.) Matarazzo, R. (City Hosp., Padua, Italy) and G. Corradi. Arch. Ital. Pat. Clin. Tumori 11(3-4):457-464, 1968.

In 21 women (38-61 yr. old) with lung cancer (adenocarcinoma in 9/21, malpighian carcinoma in 5/21, anaplastic carcinoma in 3/21, sarcoma in 2/21, alveolar carcinoma and a histologically unidentified tumor in 1/21 each), seen from 1945-1959, no significant relationship was found between lung cancer and place of residence (urban in 8/21, rural in 13/21), type of employment, smoking (only 3/21 used tobacco in any form), exposure to smog, or other exogenous factors. No significant relationship could be demonstrated between the cancer and any endogenous factor. No significant sex differences were seen with respect to symptomatology, tumor site or prognosis, although lung cancer was much less frequent in women than in men (the rates are not stated for the authors' pt. group), suggesting a possible endocrine-based immunity. The progress of the disease also appeared to be slower in women than in men.

69-2671 RESULTS OF FIVE YEARS OF SYSTEMATIC X-RAY EXAMINATIONS IN THE INDUSTRIAL COMMUNITIES OF THE URBAN REGION SURROUNDING BORDEAUX. (Fr.) De Groc, J. Arch. Mal. Prof. 30(1-2):60-63, 1969.

During the period 1962-1966, as chest X-rays almost entirely replaced fluoroscopy in routine examinations of industrial workers in the Bordeaux area, X-ray examination began to pick up disorders other than tuberculosis, including lung cancer in 1/14,640 workers examined in 1963, 4/45,599 persons examined in 1965, and 8/54,608 persons examined in 1966. During this 5-yr. period, 158,745 examinations were performed.

69-2672 SMOKING AND ORAL CANCER: EPIDEMIOLOGICAL DATA, EDUCATIONAL RESPONSES. (E.) Weir, J. M. (Amer. Dent. Assn., Chicago, Ill.), J. E. Dunn and P. E. Buell. Amer. J. Public Health. 59(6):959-966, 1969.

Relationships between cigarette smoking and deaths from cancer of the mouth and pharynx were studied in 2 groups of California men: 68,153 labor union members in several occupational groups (aged 35-64; the upper age limit was 70 yr.), surveyed in 1954-1957 and followed up through 1962 (Group I); and 69,868 American Legion members (aged 25 and over; no upper age limit was set), surveyed from 1957 through 1962 (Group II). In Groups I and II (482,658 and 336,571 person-yr. of observation, resp.), there were 4706 and 5404 known deaths during the observation period, resp. In men smoking known amounts of cigarettes who died from oral cancer, age-standardized relative risks (compared to 1.00 for non-smokers, pipe and cigar smokers, and persons who had not regularly smoked cigarettes for at least 1 yr.) for cancer of the mouth and pharynx were 2.13 and 0.61, resp., in Group I, and 2.70 and 2.08, resp., in Group II; in Group I, the relative risk for tongue cancer in smokers was 5.52. In Group I, 21 smokers (of known amounts of cigarettes) died of mouth cancer, 12 of tongue cancer and 12 of cancer of the pharynx; the data suggested a strong association between cigarette smoking and death from cancer of the tongue and (possibly) floor of the mouth. A tabulation of site-specific annual mortality rates (California, 1960-1962) and incidence rates (Alameda County, 1960-1964) for cancer of the mouth and pharynx showed that incidence rates for cancer of the pharynx (unspecified) were relatively low (second lowest of 9 sites), whereas the mortality rates were high (below only the rates for tongue cancer). Incidence rates for cancer of the tongue and floor of the mouth were 3.6 and 1.6/100,000/yr., resp. The role of the dentist in anti-smoking education is also discussed.

69-2673 THE EARLY CARCINOMA OF THE STOMACH, WITH SPECIAL REFERENCE TO ITS SURGICAL TREATMENT. (E.) Ishikawa, K. Bull. Soc. Int. Chir. 27(6):542-545, 1968.

Over a 10-yr. period, 127 pts. undergoing gastrectomy showed a total of 138 superficial carcinomas of the stomach. These pts. comprised 15% of the author's pts. with stomach cancer. Lymph node metastases were present in 7% of 62 pts. with tumors limited to the mucosa and in 27% of 65 pts. with submucosal involvement. Most pts. were over 50 yr. old at diagnosis. Polyps were noted in 20 cases and polypoid tumors in 17; 82% and 32%, resp., were identified as papillary adenocarcinomas. About 30% of 83 superficial tumors were incorrectly identified as benign (preoperatively in 25 cases, during surgery in 29). The importance of early diagnosis and radical resection of superficial stomach cancer is stressed, in view of the fact that stomach cancer causes 51% of all cancer deaths in men and 38% in women in Japan.

69-2674 STOMACH CANCER. POSITIVE ASSOCIATION WITH SUSPENDED PARTICULATE AIR POLLUTION. (E.) Winkelstein, W., Jr. (U. California Sch. Pub. Health, Berkeley) and S. Kantor. Arch. Environ. Health (Chicago) 18(4):544-547, 1969.

Suspended particulate air pollution levels were studied from July, 1961-June, 1963 in Buffalo, New York and environs. In this area, av. annual stomach cancer death rates for white men and women in the 50-69 yr. age group, tabulated for 1959-1961, were 42/100,000 in males and 19/100,000 in females. In areas where the 2-yr. av. of suspended particulate levels in the air was less than 80 or more than 135 $\mu g/m^3/24$ hr., av. annual stomach cancer death rates were 26 and 93/100,000, resp., in males, and 9 and 38/100,000, resp., in females. A positive association between air pollution and stomach cancer deaths was seen in males, and a similar, smaller tendency in females. Stomach cancer death rates were higher in low-income groups than in persons of higher socio-economic status, and higher in persons of Polish origin (immigrants and native-born combined) than in persons not of Polish origin, but the effects of socioeconomic status and ethnic groups were independent of the effects of air pollution. A positive association was also seen between air pollution and death rates from respiratory diseases in males, but not between air pollution and deaths from cancer of the lung, bronchus or trachea. This association between air pollution and stomach cancer was not seen in persons over 70; possible reasons for this lack of correlation (residential mobility; more uniform exposure to particulate air pollution, perhaps coal soot from heating units and railroads, before 1940; or selection of susceptible persons out of the population before age 70) are discussed.

69-2675 DISTRIBUTION OF THE ABO BLOOD GROUPS AMONG PATIENTS WITH GALLSTONES AND CANCER OF THE GALLBLADDER. (Ger.) Schmauss, A. K. (City Hosp., Friedrichshain, Berlin), L. Perlin and E. Küpferling. Deutsch. Z. Verdau. Stoffwechselkr. 28(5-6):317-321, 1968.

equencies of the ABO and Rh blood groups were udied in 15,154 normal Berliners, 3082 pts. th cholelithiasis and 100 pts. with cancer of e gallbladder. In the normal subjects and the ncer pts., blood group A was seen in 41.6% and %, resp., group B in 14.83% and 16%, resp., oup 0 in 37.23% and 34%, resp., and group AB 6.28% and 4%, resp. The differences between e cancer pts. and the controls, with respect the frequencies of the individual blood oups, were not statistically significant; however, if only groups A and 0 were considered, e cancer pts. showed a higher frequency of oup A than the controls. In the pts. with olelithiasis, the results suggested that in rsons with European living habits, cholelithiasis velops more frequently and at an earlier age persons of blood group A than in persons of roups B or 0. Frequencies of the Rh factor ere about the same in the controls and in both t. groups.

9-2676 CLINICAL AND MORPHOLOGICAL PICTURE OF CANCER OF THE HEAD OF THE PANCREAS.
Rus.) Mikhailov, V. Ia. (Omsk Med. Inst., SSR). Vop. Onkol. 15(3):98, 1969.

n 1945-1964 (inclusive), 23,920 autopsies were erformed in Omsk. Cancer of the pancreas was ound in 152 autopsies (about 0.64%; 77 males, 5 females); 95/152 of these cancers (42 in ales, 53 in females) were localized in the head f the pancreas. Metastases were seen in 68/95 71.57%). Most of these tumors arose from the pithelial cells of the pancreatic tubules.

9-2677 A PRELIMINARY NOTE ON A RECENT INCREASE IN THE INCIDENCE OF HEPATOMA IN THE
EST NILE DISTRICT OF UGANDA. (E.) Williams, . H. (Kuluva Hosp., Arua, Uganda). E. Afr. Med. . 46(3):179-181, 1969.

The records of the Kuluva Hospital since 1960 (together with several earlier cases going back to 1951) showed that hepatomas accounted for 7.5% of all malignant tumors seen at this hospital up to 1965. In 1966 and 1967, however, as many pts. with hepatoma were seen as in the 4 preceding yr.; during this 2-yr. period, hepatomas comprised 11% of all tumors. Five pts. with hepatoma, seen during a single 7-mo. period (August, 1967-February, 1968), lived within a 7-km radius of Kuluva, and 3 other pts. from this same small area were seen in 1960, 1961 and 1964. This time-space cluster suggested an infectious agent in the etiology of hepatoma. The 1966-1967 peanut (groundnut) crop in this region was unusually prolific. A recent increase in *Aspergillus flavus* infection of peanuts grown in this area is suggested. The aflatoxin levels of peanuts from this area are not stated, but peanuts grown in other areas of Uganda show high aflatoxin levels. Careful plotting of the homes of hepatoma pts. in other areas of East Africa is recommended, in an attempt to detect similar clusters.

69-2678 CLINICAL SIGNIFICANCE OF ADENOCARCINOMA OF THE CERVIX. (E.) Abad, R. S., S. S. Kurohara (666 Elm St., Buffalo, N. Y.) and J. B. Graham. Amer. J. Obstet. Gynec. 104(4):517-522, 1969.

From 1920 to 1953, 4573 women were treated for primary cancer of the cervix; 4397 pts. (96.2%) had squamous cell carcinoma (Group I), 43 pts. (0.9%) had adenosquamous carcinoma (Group II), and 132 pts. (2.9%) had adenocarcinoma (Group III). In Group I, 78/4397 were Negro and 6/4397 were Jewish, compared to 2/175 and 1/175, resp., in Groups II and III combined. The marital ratio (number ever married/number never married) was significantly higher in Group I (39.3) than in Groups II or III (20.5 and 15.5, resp.). In Groups I, II and III, 15.1%, 20.9% and 23.5%, resp., were nulliparous, while 58.3%, 59.5% and 71.2%, resp., were postmenopausal. Obesity was slightly but not significantly more frequent in Group III than in the other 2 groups. The frequencies of diabetes mellitus were about the same in all groups. The data suggested some biological differences between women with squamous or glandular types of cancer, but the survival rates after radiotherapy were about the same in these pt. groups.

69-2679 CERVICAL CANCER IN A HOUSING PROJECT: REPORT OF A CLUSTER OF CASES. (E.) Smith, D. B. (1520 Farnell Court, Decatur, Ga.) and R. S. Jenkins. Amer. J. Obstet. Gynec. 104(4):603-605, 1969.

The records of the Grady Memorial Hospital (Atlanta) showed 242 histologically verified new cases of epidermoid carcinoma of the cervix in 1965 and 1966. Most of these pts. (199/242 = 83%) were residents of Fulton County. One of the county's census tracts yielded 12 of these cases; 10/12 pts. lived in a single Atlanta housing project for low-income families (all residents of this housing project are Negro), and 6/10 women lived on the same street. In these 10 women (5 with carcinoma *in situ*, 5 with invasive carcinoma), av. ages at first coitus and first pregnancy were 15.7 and 18.1 yr., resp.; the mean age at time of diagnosis of cancer was 40.1 yr. All women reported multiple sexual partners (at least 2 women had sexual relations with the same man). The frequency of cancer of the cervix in this housing project was 68.8/10,000 population, compared to 12.3 for the av. Atlanta housing project (there are 12 low-income housing projects in Atlanta) and an av. of 4.4 for American women. In contrast to the high incidence of cancer of the cervix, this housing project showed low rates for cancer of the breast and corpus uteri. Venereal transmission of a carcinogenic agent is suggested.

69-2680 PREVENTION OF CANCER OF THE UTERINE CERVIX. METHODS AND RESULTS. (E.) Padovec, J. (Charles U., Prague), J. Kanka and I. Subrt. Int. Surg. 51(5, Sec.1):443-449, 1969.

From March 1, 1964-January 31, 1967, all women admitted to the clinical outpatient department of the authors' hospital underwent combined colposcopic and cytological examination; 4470 combined examinations were performed in 2632 pts. In this pt. group, 28 clinical carcinomas, 70 preclinical carcinomas and 37 dysplasias of the cervix were detected. The reliability of this combined method was shown by the fact that only 2.8% of the preclinical carcinomas and 5.4% of the dysplasias were not detected by this method.

69-2681 CYTOLOGICAL TYPE III IN THE FIGHT AGAINST FEMALE GENITAL CANCER. (SURVEY OF 5500 CLINICAL HISTORIES.) (Sp.) Benasco Naval, C. (Sacred Heart Hosp., Barcelona, Spain). Acta Ginec. (Madr.) 20(1):1-5, 1968.

Type III cervical or vaginal cytological changes were found in 134/5500 women (2.4%) examined by colposcopy or Papanicolaou smear, including 14/134 (10.4%) with biopsy-confirmed active malignant tumors: 8 carcinomas of the cervix (1 in Stage IV, 3 in Stage III, 2 each in Stages I and 0), 4 endometrial carcinomas, and 1 case each of vaginal carcinoma and sarcoma. Severe cervical dysplasia was seen in 11/134 (9.0%); 1/11 also showed a Stage 0 intraepithelial carcinoma of the cervix and another pt. showed atypical endometrial hyperplasia. Other, less serious, cervical dysplasias were seen in 45/134 (33.5%): chronic non-specific cervicitis in 19/45, moderate, generalized dysplasia in 14/45, epidermization in 7/45 and cervical polyps in 5/45. Atypical vaginal flora were noted in 66/134 (49%; Trichomonas in 20/66, moniliasis in 19/66, atypical bacilli or cocci, chiefly Enterococcus, in 27/66).

69-2682 HISTOLOGICAL EVALUATION OF CYTOLOGICAL TYPE III LESIONS. (Sp.) Rodriguez-Soriano, J. A. (Sacred Heart Hosp., Barcelona, Spain) and C. Benasco Naval. Acta Ginec. (Madr.) 20(1):7-12, 1968.

Biopsy examination, performed in 71/134 pts. showing Type III cytological lesions (described in the preceding abstract), showed 14 malignant tumors of the vagina (2), cervix (8) or endometrium (4), 11 cases of severe cervical dysplasia, 1 case of endometrial atypia, and 45 cases of benign lesions of the cervix.

69-2683 RESULTS OBTAINED BY THE STUDY OF 35,000 CYTOLOGICAL SMEARS AND 5000 COLPOSCOPIC EXAMINATIONS. (Sp.) Zamarriego, J. (La Paz City Hosp., Madrid), F. Escalonilla, J. Tubio and S. Calvo de Mora. Acta Ginec. (Madr.) 20(1):13-20, 1968.

Of 28,001 smears obtained over 2.5 yr. (1966-1968) in an early cancer detection program in Madrid (sponsored by the Spanish Social Security Agency), 282 (0.83%) were described as Type III and 271 (0.67%) as Type IV (50/282 and 83/271, resp., on a second or subsequent examination). False-positive Type III smears (on the first examination) were seen in 67/232 (28.8%); false positive Type IV smears were seen in 6/188 (3.7%), together with 14/188 pts. (7.4%) whose lesions were actually premalignant in nature. The 307 confirmed pre-malignant lesions (1.09%) included 250 cervical dysplasias (0.89%) and 57 endometrial hyperplasias (0.20%). Also discovered were 198 cases of active malignancy (0.70%), including 32 carcinomas in situ of the cervix (0.11%), 87 early invasive carcinomas (0.31%) and 65 clinically advanced carcinomas of the cervix (0.23%), together with 13 endometrial carcinomas in the early invasive stage (0.04%) and 1 in a clinically advanced stage (0.003%). In general, colposcopy was more effective than the smears in demonstrating premalignant cervical lesions, while the smear was more successful in demonstrating malignant cervical lesions.

69-2684 CAMPAIGN FOR THE EARLY DIAGNOSIS OF UTERINE CANCER BY A GYNECOLOGIC TEAM OF THE SOCIAL SECURITY AGENCY. (Sp.) Vilar Dominguez, E. (Miralles Hosp., Madrid), J. Areosa, J. Lorenzo Valles, J. Zamarriego, F. Escalonilla, J. Tubio and S. Calvo de Mora. Acta Ginec. (Madr.) 20(1):27-36, 1968.

A total of 1076 colposcopic examinations, performed in 980 women referred by physicians to a center for early cancer detection, disclosed benign lesions in 743/980, premalignant lesions in 63/980 (leukoplakia, mosaic tissue, basement membrane changes, vascular irregularities, erosion and/or polyps), and active cancer in 2 pts. Two additional tumors were detected in the same pt. group by a total of 1264 Papanicolaou smears; biopsy examination of specimens from 205/980 pts. disclosed an additional benign fibroadenoma in 1 pt.

69-2685 CYTOLOGICAL DIAGNOSIS OF ATYPICAL LESIONS OF THE UTERINE CERVIX. (Sp.) Mateu-Aragonés, J. M. Acta Ginec. (Madr.) 20(3):189-204, 1968.

Two groups of female residents of Barcelona (over 30 yr. of age) underwent colposcopic examination and cervical smear screening: 1858 pts. of the obstetrics-gynecology clinic of a university hospital, and 4294 women seen in an early cancer detection program (sponsored by the Spanish Social Security Agency). The dates of

he study are not stated. In the total group of
152 women, the cytological diagnosis was
ystrophy in 0.86% (53 pts.), mild dysplasia in
.71% (43 pts.), moderate dysplasia in 0.14%
9 pts.), severe dysplasia in 0.06% (4 pts.),
arcinoma in situ in 0.08% (5 pts.), micro-
arcinoma in 0.06% (4 pts.) and invasive
arcinoma in 0.63% (40 pts.). Mild and moderate
ysplasias were more frequent in the obstetric
ts. than in the other group (1.12% and 0.77%,
esp.), and no invasive carcinomas were seen
mong the obstetric pts. No other significant
ifferences in the detection rates of premalig-
ant or malignant lesions of the cervix were
een between these 2 groups.

9-2686 LONG-TERM FOLLOW-UP RESULTS IN CASES
OF RECURRENT CERVICAL POLYPS, IN
ELATION TO UTERINE CANCER AND PRECANCEROUS
TATES. (Pol.) Monsiorski, J. (M. Curie
klodowskie 9, Bydgoszcz, Poland), A. Gustowski
nd Z. Kasperowicz. Ginek. Pol. 40(2):155-161,
969.

rom 1947-1967, 212/1432 pts. with cervical
olyps developed recurrences (twice in 185 pts.,
 times in 22 pts., 4 times in 5 pts.). Recurrent
olyps were observed most frequently at ages
1-55 yr. Paratypia was detected (after 2-20 yr.
f observation) in 11 pts. with recurrent polyps
2-4 times); erosions of the vaginal epithelial
ining and glandular hypertrophy of the
ndometrium were seen in 4 pts. (after 9-18 yr.
f observation and 2-3 recurrences). Four pts.
eveloped cancer (1.8% incidence): adenocarcinoma
f the cervix in 1/4 (3 recurrences of the
olyps over 17 yr. of observation), adenocarcinoma
f the endometrium in 1/4 (3 recurrences of the
olyps over 19 yr. of observation), and pre-
invasive carcinoma of the cervix, originating
from the polyps, in 2/4 (after 4 recurrences and
16 yr. of observation in 1/2; after 2 recurrences
and 9 yr. of observation in 1/2).

9-2687 CARCINOMA OF THE BREAST IN JAPANESE
WOMEN LIVING IN HAWAII. (E.)
Stemmermann, G. N. (U. Hawaii Sch. Med.,
Honolulu) and P. Lipkovic. Gann 60(2):181-186,
1969.

In Caucasian and Japanese women living in Hawaii, breast cancer morbidity rates are about the same during the childbearing period, but postmenopausal Japanese women show a much lower rate than the Caucasian women (previously published study). Since most of the postmenopausal Japanese women in this study were first-generation immigrants to Hawaii, whereas most of the premenopausal women had been born in Hawaii, a further study was conducted, based on data for 92 Hawaiian Japanese (H-J) women with breast cancer, seen in 3 Honolulu Hospitals from 1954-1963. The median age in this group was 43 yr,; 72% were under 50. A comparison of this group with 2 other pt. groups (from New York City and from Japan) showed a much lower proportion of postmenopausal pts., a smaller av. tumor size, fewer axillary lymph node metastases, and a greater 5-yr. survival rate, in the H-J group than in the other 2 groups. The H-J group was closer to the Japanese group than to the New York City group in these respects. It is suggested that the increased breast cancer frequency in young H-J women (of the second and third post-immigration generations) might result from the action of a carcinogenic factor which begins to operate during the childbearing period (in which case, these women would show an increasing frequency of breast cancer as they grow older), or a factor affecting women only during the childbearing period.

69-2688 CANCER OF THE PENIS IN INDIANS.
(Sp.) Covarrubias, C., J. H.
(Antonio Lorena Reg. Hosp., Cuzco, Peru).
Acad. Peru. Cirug. 21(1):121-125, 1968.

Most pts. with cancer of the penis seen at the author's hospital were Indians or mestizos (no other details). Over an 18-yr. period, 20 apparently full-blooded Indian men with squamous cell carcinoma of the penis were seen. Phimosis was present in 10/20, and 3/20 reported histories of trauma. The roles of syphilis and papilloma as predisposing factors are discussed, but the number of pts. with such histories in this group is not stated. The Indians of the Cuzco area do not practice circumcision, and local custom forbids any cleansing of the genital organs.

69-2689 CARCINOMA OF THE PROSTATE IN ELDERLY
MEN: INCIDENCE, GROWTH CHARACTERISTICS
AND CLINICAL SIGNIFICANCE. (E.) Scott, R., Jr.
(Baylor U. Sch. Med., Houston, Tex.), D. L.
Mutchnik, T. Z. Laskowski and W. R. Schmalhorst.
J. Urol. 101(4):602-607, 1969.

The prostate glands of 158 autopsied men over 70 (including 58 men over 80) were examined in their entirety by serial step-section. Carcinoma was detected in 46% of this group (41% of the men aged 70-79, 57% of the men aged 80 and over). By comparison, examination of random sections of the prostate glands from 5000 consecutively autopsied men disclosed carcinoma in 15% of the men aged 70-79 and 26% of the men aged 80 and over (previously reported). Step-section examination of the prostates nearly doubled the cancer detection rate in men who had not been suspected of having carcinoma (by comparison with the results of routine autopsy examination); 40% of the pts. with poorly differentiated carcinomas (identified by step-section examination at autopsy), and only 6% of the pts. with well-differentiated carcinomas, had shown clinical, enzymatic or biopsy signs suggesting prostate cancer during life. Only about 30% of the tumors over 1 cm in diameter had been diagnosed before death, and lesions less than 4 mm in diameter were rarely apparent clinically; however, 4% of the lesions less than 4 mm in diameter and 7% of the tumors of 4-10 mm diameter produced metastases. Serial step-section examination of prostatectomy specimens from pts. with prostatic enlargement is recommended.

69-2690 EXPERIENCE WITH THYROID MALIGNANCY IN A PRIVATE REFERRAL LABORATORY. (E.) Hamburger, J. I. (Northland Thyroid Lab., Southfield, Mich.). Mich. Med. 68(11):575-580, 1969.

Over 7.5 yr. (July, 1961-December, 1968), malignant tumors were found in 89/about 7000 pts. with thyroid disease referred to the author's laboratory, mostly from metropolitan Detroit. Most of the 80 differentiated tumors were seen in the 20-60 yr. age group; 4/4 anaplastic tumors were seen in pts. over 40. The group included 23 males and 66 females; 2/89 were under 10 yr. old and 7/89 were in the 10-19 yr. age group. A disproportionately large number of tumors (33%) developed in upper pole nodules; only 1 tumor developed in nodules of the isthmus. Histories of radiotherapy (RT) directed to the neck or thymus were noted for 7 pts.: 1/7 received RT of the tonsils (age 5 yr.), 2/7 were treated for acne (age 12 or 23 yr.) and 1/7 received RT for Bell's palsy (age 17 yr.). In these 7 pts., thyroid cancer developed 10-15 yr. after RT.

69-2691 AMELOBLASTOMAS IN AFRICANS FROM TANZANIA AND UGANDA. A REPORT OF 56 CASES. (E.) Slavin, G. (Roy. Infirm., Glasgow, Scotland) and H. MacD. Cameron. Brit. J. Cancer 23(1):31-38, 1969.

The records of the Central Pathology Laboratory in Dar-es-Salaam for 1957-1965 (inclusive) disclosed 40 cases of ameloblastoma from Tanzania; the records of the Kampala Tumor Registry for 1962-1965 (inclusive) disclosed 16 similar cases from Uganda. Nine other cases were excluded, either because the material was insufficient to substantiate the diagnosis (8/9) or because of an incorrect diagnosis (1/9). The 56 histologically verified ameloblastomas were seen predominantly in males and at least 48/56 (86%) arose in the mandible. In the 41 pts. of stated age, the av. age was 33.7 yr. (range, 3.5-80 yr.); the group included 2 children under 5. Ameloblastomas of the granular cell type were more frequent in this group (21%) than in white pts. When the origin of the tumor could be determined (some tumors were too large to ascertain the initial site), the mandibular molar region appeared to be affected most often. Right- and left-sided tumors were about equally preponderant. In 23/28 pts. with tumors of known duration, the tumors had been present for less than 5 yr. before hospitalization, but 1 tumor had been present for 17 yr. (and had recurred 9 times). It is suggested that the reportedly high frequency of ameloblastomas in Africans may be at least partly the result of the reporting of tumors with a long natural history. The series also included 2 adenoameloblastomas (apparently a separate entity from the classical ameloblastoma, with a distinctive histology and natural history).

69-2692 TUMORS OF THE JAWS IN KOREA. REPORT OF 157 CASES. (E.) Chung, D. H., J. E. G. Kinnman (Karolinska Hosp., Stockholm), B. C. Lee and Y. T. Lee. Oral Surg. 27(6): 716-728, 1969.

Examination of the records of 16,520 new outpatient admissions to the Otolaryngology Department of the National Medical Center (Seoul) in 1959-1965 (inclusive) disclosed tumors of the jaws in 157 pts. (about 1%). A comparison with previously reported data showed that this frequency was higher than in most other nations (0.18% of all tumors in 1 study in Denmark), but resembled the high frequency of jaw tumors in Africa (3.6% of all tumors in 1 study). These 157 jaw tumors comprised 85 carcinomas, 25 sarcomas, 4 melanomas, 3 mixed tumors (excluding 10 mixed tumors of the salivary glands), 20 ameloblastomas, 10 fibrous dysplasias, 8 cysts and 2 osteomas; except for the ameloblastomas, a majority of the tumors of all types arose in the maxilla. The pt. group comprised 95 males and 62 females; 5/157 were 0-10 yr. old and 21/157 were 11-20 yr. old at diagnosis. Sarcomas comprised 21.4% of the malignant tumors of the jaws; nearly half of these were reticulum cell sarcomas (elsewhere considered rare in this location), but none resembled Burkitt's lymphoma. The 20 ameloblastomas comprised over 12% of the tumors, compared to a worldwide frequency of about 1% of all jaw tumors (except for 13-40% in Africa), with a rather high frequency in males under 41 (10 cases). All pts. with fibrous dysplasia (about 6% of the group) were under 41 yr. old at diagnosis (9/10 were under 31); in contrast to the reported 3:1 female preponderance for this tumor, this pt. group included 6 males and 4 females. The similar frequencies of all jaw tumors (and of the ameloblastomas and fibrous dysplasias) in this Korean group and in Africa are noted, but no explanation is offered for the differences between these frequencies and the much lower rates reported elsewhere in the world.

69-2693 EPIDEMIOLOGY OF PRIMARY BONE TUMORS IN AREQUIPA. (Sp.) Stanfield, L. L. (Gen. Hosp., Arequipa, Peru), L. Fernan Zegarra, J. Palao De Torres, G. Huertas Tejada, P. Saavedra Virhuez, O. Becerra Caballero, M. Palao Villegas, E. Barrientos and L. Mendoza Valcarcel. Acad. Peru. Cirug. 21(1):19-24, 1968.

cords of 4 hospitals in Arequipa Province
ated 1960-1962 and 1963 onward for a 25-bed
neral hospital; from November, 1944 for a 140-
d hospital with 22,700 clinic pts.; from
ril, 1962 for a 150-bed obstetric hospital with
,000 clinic pts.; and from August, 1960 for a
8-bed general hospital), through February,
68, disclosed 103 cases of primary bone tumors.
the 24 pts. with malignant tumors (8 osteo-
rcomas, 7 multiple myelomas, 3 Ewing's sarcomas,
chondrosarcomas, 2 malignant giant cell tumors,
fibrosarcoma, 1 neurofibrosarcoma which
peared to be of osseous origin), the female:male
tio was 2:1 and the age range was 7-78 yr.
st pts. were 15-20 yr. old at diagnosis. In
e 79 pts. with benign tumors, the male:female
tio was 2:1; the age distribution was about
e same as in the pts. with malignant tumors.
is group of benign tumors included 5 giant
ll tumors, 35 osteochondromas, 17 osteoid
teomas, 12 chondromas, 7 osteomas, 2 unclassi-
ed benign tumors and 1 mixed chondrofibroma.
imary bone tumors are described as relatively
equent in this area, although incidence rates
e not available.

-2694 SPONTANEOUS NEOPLASMS OF THE NERVOUS SYSTEM IN ANIMALS. (E.) Luginbühl, H.
. Pennsylvania Sch. Vet. Med., Philadelphia),
Fankhauser and J. T. McGrath. *Progr. Neurol.*
rg. 2:85-164, 1968.

e frequencies and pathology of nervous system
umors in animals was studied, on the basis of a
iterature survey (187 references) and examina-
ion of about 900 specimens in several collec-
ions. The most frequent tumors were neuro-
ctodermal (30.5% of 1 collection) or mesodermal
umors of the brain, sarcomas, pituitary adenomas
50 were examined; 31/50 were from dogs) and
econdary tumors (over 200 cases; 80% were
ematogenous). The most frequent intracranial
umors were meningiomas (more than 40 from dogs,
0 from cats). Neuroectodermal tumors were rare
n cats, but over 60% of the neuroectodermal
umors noted were oligodendrogliomas from dogs.
he relative frequencies of the neuroectodermal
umors and pituitary tumors in dogs were com-
arable to those seen in man; these tumors
except for the choroid plexus papillomas)
howed a definite predilection for dogs of
rachycephalic breeds (bulldogs, boxers, Boston
erriers). About 80% of the hematogenous
econdary tumors were seen in dogs (most with
rimary mammary tumors), 10% in cats, and 10%
n other species. Bovine neurofibromatosis was
nly slightly similar pathologically to human
eurofibromatosis.

9-2695 A MODEL OF CANCER STUDIED BY A COMPUTER. (E.) Tsanev, R. (Biochem.
es. Lab., Sofia) and B. Sendov. *J. Theor. Biol.*
3(1):124-134, 1969.

A mathematical model of liver carcinogenesis was studied using a digital computer. The authors' theory assumed the existence of *n* active functional operons (D_i), 1 of which (D_M) is related to the mitotic operon M, which represents the first of several mitotic operons which are successively activated during the mitotic cycle. A system showing the growth properties of liver tumor cells (possible latent periods; growth stimulation by different methods including partial hepatectomy; diverse proliferative reactions in cells from different parts of the liver cell cord) was obtained by irreversible blocking of the D_M operon. This blocking would theoretically result in cells which are unable to remain in a resting state. However, the results also showed that the growth rate of D_M-blocked cells in an asynchronous population also depends on the production of 2 repressors (R_D and R_M) by the surrounding normal cells (they are not produced after irreversible blocking of D_M).

69-2696 FREQUENCY DISTRIBUTION OF STAGES OF THE CELL CYCLE OF MOUSE ASCITES TUMORS FOLLOWING *IN VIVO* AND *IN VITRO* LABELING WITH TRITIATED THYMIDINE. (E.) Hrushovetz, S. B. (U. Manitoba Sch. Med., Winnipeg, Canada). *Canad. J. Genet. Cytol.* 11(1):217-226, 1969.

When cells from 5 sublines (of differing chromosome numbers) of the Ehrlich ascites mouse carcinoma were labeled *in vitro* with ^{3}H-thymidine and examined by the direct pulse labeling method (DNA cytophotometry and cellular autoradiography), the relative frequencies of cells in the S, G_1, G_2 and M phases of the cycle were the same as in cells studied by *in vivo* labeling and the indirect method (labeled metaphase curves). This *in vitro*, direct labeling method yielded reproducible results in repeat experiments using the same tumor subline, and in experiments on 2 tumor sublines of hypotetraploid karyotype.

69-2697 OBSERVATIONS ON RNA IN PROSTATE AND BLADDER NEOPLASMS. (E.) Fingerhut, B., R. J. Veenema (99 Ft. Washington Ave., New York, N. Y.), S. Graff and M. P. Butler. *J. Urol.* 101(4):608-614, 1969.

Autoradiographic evaluation using H^3-labeled cytidine (RNA precursor) in bladder and prostate cells indicated a significant difference in the localization and number of extra- or intranuclear grains, between normal and malignant cells. A dilute soln. of labeled cytosine (10 µC/ml) showed better definition than a 20 µC/ml soln. and permitted the more accurate quantitation and localization of H^3-labeled RNA. Malignant prostate or bladder tumors (including bladder tumors induced by N-2-fluorenylacetamide in rats) showed intranuclear high grain counts, whereas the corresponding normal tissues showed extranuclear low grain counts.

69-2698 THE KINETICS OF CELLULAR PROLIFERATION IN NORMAL AND MALIGNANT TISSUES. III. CELL PROLIFERATION IN THE LARYNX. (E.) Fabrikant, J. I. (Johns Hopkins U. Sch. Med., Baltimore, Md.) and J. Cherry. Ann. Otol. 78(2):326-341, 1969.

In vitro labeling of surgical and biopsy specimens with ^{3}H-thymidine showed that the range of tissue doubling times for normal human laryngeal mucosa was about 100-150 hr. (slightly less in children than in adults). Tissue doubling times for carcinoma of the larynx were well within the normal range (100-150 hr.), but in inflammatory lesions the turnover rates were much greater than in malignant or normal tissues. It is concluded that growth rates of human tissues are dependent both on cell proliferation rates and on the extent of cell loss.

69-2699 COMPARATIVE ANALYSIS OF THE EFFECTS OF SINGLE OR FRACTIONATED RADIATION ON NORMAL AND MALIGNANT TISSUES WITH SIMILAR MITOTIC ACTIVITY. (Rus.) Shiffer, I. V. (Cent. Roent.-Radiol. Inst., Leningrad, USSR). Biull. Eksp. Biol. Med. 67(1):66-69, 1969.

In cells of normal mouse corneal epithelium and cells from the ascites or solid forms of the Ehrlich mouse carcinoma, the mitotic indices were 18.7, 16.4 and 15.4, resp. The mitotic aberrations and growth rate changes induced by single or fractionated doses of irradiation (1000 or 2000 r) persisted for a longer time in the tumor cells than in the normal cells. In the tumor cells, the effects of fractionated radiation doses were additive.

69-2700 CHANGES OF CELL PROLIFERATION CHARACTERISTICS IN A RAT RHABDOMYOSARCOMA BEFORE AND AFTER X-IRRADIATION. (E.) Hermens, A. F. (Radiobiol. Inst. TNO, Rijswijk, Netherlands) and G. W. Barendsen. Europ. J. Cancer 5(2):173-189, 1969.

The vol. doubling time of the R-1 rhabdomyosarcoma (a subline of a rhabdomyosarcoma from an irradiated rat of the inbred WAG/Rij strain, transplanted s.c. in WAG/Rij rats) decreased as tumor vol. increased; this resulted from a lengthening of the mean cell cycle time (20 to 25 hr.) in parts of the tumor, corresponding to a decreased rate of production of new cells (the growth fraction decreased from 0.42 to 0.29) and an increased cell loss rate. When large s.c. tumors (1.5 cm^3 in vol.) were irradiated (2000 rads of X-rays), tumor vol. decreased to minimum values after 6-8 days (following a slow increase in the first 2 days), then increased to pretreatment values at 12 days. Irradiated tumors showed a reduction of the cell cycle time (to about 12 hr.) and the cell growth fraction (to 0.008), however; after 4 days, cell loss exceeded cell production. In small and large clones (about 80 and 1200 cells, resp.) of R-1 cells in vitro, mean cell cycle times were 16 and 16.5 hr., resp., and growth fractions were 1.0 and 0.39, resp. Cell loss was not seen in small clones; the cell loss factor in large clones was small.

69-2701 THE USE OF THREE-DIMENSIONAL MATRIX TISSUE CULTURE FOR BIOASSAY OF CANCER: A PROGRESS REPORT. (E.) Leighton, J. (U. Pittsburgh, Pa.), G. Justh and R. Mark. Recent Results Cancer Res. 17:147-163, 1969.

69-2702 DISCUSSION: THE USE OF THREE-DIMENSIONAL MATRIX TISSUE CULTURE FOR BIOASSAY OF CANCER. (E.) Sanford, K. (NCI, Bethesda, Md.). Recent Results Cancer Res. 17:163-167, 1969.

See also abstract nos.: 2500,2502,2505,2506,2507,2540,2541,2546

69-2703 PROBLEM OF THE ORIGIN OF EPITHELIAL NEVI IN RELATIONSHIP TO THE NEVUS OF SWEAT GLAND CELLS. (Fr.) Follmann, E. (U. Buenos Aires). Dermatologica (Basel) 138(4):251-262, 1969.

Five young adults (aged 20-32 yr.) with nevi of the sweat glands (single in 4/5, multiple in 1/5) are described. In 4/5 (1 man, 3 women), the nodules had developed at age 10-17 yr.; in 1/5 (a woman), the nodule had been present since birth. No particular site predilection was noted (arm in 2/5, hand, thorax and leg in 1/5 each). The origin of these nevi in cells of the secretory portion and/or ducts of the sweat glands provided evidence against the theory that epithelial cell nevi are of neurogenic origin.

69-2704 HEREDITARY AND PREVENTIVE ASPECTS OF RETINOBLASTOMA. (E.) Ellsworth, R. M. Sightsav. Rev. 39(1):17-20, 1969.

The author's series of 900 pts. included many cases of parent-to-child transmission of retinoblastoma for 3 successive generations or more, and several cases in identical twins. In such families, the tumor was usually transmitted as an autosomal dominant disease with an av. penetrance of about 60% (80% penetrance is assumed for genetic counseling purposes), although some families showed a much lower penetrance, with transmission patterns almost suggesting a recessive condition. Only about 10% showed positive family histories. This pt. group included 12 families with previously negative histories, in which 2 or more children developed retinoblastoma. In such families, the chance that a second child (including an older sibling) may develop the tumor is now estimated at about 4% (it was previously thought to be very low). Examination of all siblings (perhaps cousins and even more distant relatives) of affected children from such families, is recommended. No gross chromosomal anomalies were seen in members of 17 families with hereditary retinoblastoma; 14 known chromosomal markers are now being studied, in an attempt to identify any associated enzyme-linked characteristic(s) that would aid in the identification of the chromosome carrying the retinoblastoma gene, but no results are yet available. It is suggested that any child with strabismus should be suspected as having retinoblastoma until proved otherwise.

69-2705 INFLUENCE OF HEREDITARY FACTORS IN THE DEVELOPMENT OF PIGMENTED TUMORS OF THE SKIN. (DISCUSSION OF THREE VERIFIED CASES OF MALIGNANT MELANOMA IN THREE SIBLINGS). (It.) Cirenei, F. (Civil Hosp., Rapallo, Italy). Cronache Dell'I.D.I. 23(5):345-351, 1969.

The 6 children of a red-headed father with light-colored eyes, a very fair complexion and many benign nevi (scattered all over the body), resembled him in coloring and the presence of varying numbers of nevi. The mother was dark (black hair, olive complexion), but had a brother (who died young of unknown causes) with red hair. Three of the siblings (2/4 brothers, 1/2 sisters) developed histologically verified malignant melanomas (age 27-29 yr.) from apparently benign nevi of long standing, following traumatization of the affected nevi.

69-2706 DYSPROTEINEMIA AND PLASMACYTOMA AS PART OF THE GERIATRIC PICTURE. (It.) Di Guglielmo, R. (U. Florence, Italy) and G. Guidi. G. Geront. 16(10):1119-1131, 1968.

Clinical, pathological and (sometimes) immunoelectrophoretic findings in 158 pts. with plasmacytoma and 4 pts. with Waldenström's macroglobulinemia are discussed. Very few of these pts. were under 40 or over 80; the great majority were in the 50-70 yr. age group at diagnosis. It is concluded that the dysproteinemic plasma cell diseases are seen almost exclusively in pts. of advanced age, but the clinical, pathological, humoral and other characteristics of the disease (including the response to treatment) are not related to age. In many pts., the disease seemed to be of several yr. duration (the "latent phase") prior to diagnosis, and apparently had begun with a disorder of immunity.

69-2707 MALIGNANT TUMOR OF THE CENTRAL NERVOUS SYSTEM ASSOCIATED WITH POLYPOSIS OF THE COLON WITH MALIGNANT DEGENERATION. (Por.) Mattosinho Franca, L. C. (Public Service Hosp., São Paulo, Brazil) and W. L. Sanvito. Arch. Neuro-Psiquiat. 27(1):67-72, 1969.

A 14-yr.-old girl who died with a spongioblastoma of the brain stem, showed polyposis of the colon with areas of malignant degeneration and liver metastases at autopsy. A literature survey (7 references) disclosed 2 similar cases, in adolescent brothers. This pt. was not related to the other 2 reported cases; her siblings were believed to be normal, but could not be examined. The family history was reportedly negative.

69-2708 TEN NEW CASES OF BLADDER CANCER IN PATIENTS WITH BILHARZIASIS. (Fr.) Nosny, P. and F. Laine. Med. Trop. (Marseille) 29(2):181-183, 1969.

Ten pts. with Schistosoma haematobium infections associated with bladder cancer were reported from an area of endemic schistosomiasis

(Majunga region) in the Malagasy Republic. These pts., all males, were younger than most European pt. groups with bladder cancer (range, 17-70 yr.; 6/10 were 35 and under). All pts. had chronic hematuria, sometimes of many yr. duration; in some parts of this endemic schistosomiasis area, hematuria is regarded as normal.

69-2709 MALIGNANT TRANSFORMATION OF JUVENILE PAPILLOMATOSIS OF THE LOWER RESPIRATORY TRACT. (Fr.) Labas, Z. (Apathy Hosp., Budapest). Bronches 19(1):124-133, 1969.

A 2-yr.-old boy with juvenile papillomatosis of the larynx was treated repeatedly by surgery for about 15 yr. At age 13 yr. a permanent cannula was inserted, because of involvement of the entire larynx and invasion of the trachea and bronchi. At the same time, the tumors began to become hard and difficult to remove. Malignant transformation of some of the papillomas was first seen at age 20 yr. Following a brief response to radiotherapy, the malignant transformation continued (benign and transformed tumors were often seen side by side); the pt. died 18 mo. later, showing renewed invasion of the trachea, bronchioles and both lungs. Although juvenile papillomatosis of the larynx usually tends to disappear spontaneously with the onset of puberty, 3/17 adolescents (under observation at the time of report showed persistent tumors, which had become more firm than they had been prior to puberty. No signs of malignant transformation were noted in these 3 pts.

69-2710 ULTRASTRUCTURE OF THE BASEMENT MEMBRANE IN NORMAL AND HYPERPLASTIC HUMAN ORAL EPITHELIUM COMPARED WITH THAT IN PREINVASIVE AND INVASIVE CARCINOMA. (E.) Frithiof, L. (Karolinska Inst., Stockholm). Acta Path. Microbiol. Scand. Suppl. 200:1-63, 1969.

Basement membrane ultrastructure was studied in specimens of the normal oral mucosal epithelium from 21 pts., in 25 specimens with regularly ordered epithelial hyperplasia (with hyperkeratosis and/or acanthosis), 13 specimens of preinvasive lesions (ranging from dysplasia to carcinoma in situ), and 10 specimens of invasive squamous cell carcinoma. All of the invasive tumors and some of the preinvasive lesions showed some areas of thin, defective and occasionally absent basement membranes. Half-desmosomes were absent if the basement membranes were absent, and reduced in size if the basement membranes were very thin. This reaction might be related to the more or less incomplete tissue-specific antigens associated with the tumor cells. Four specimens of invasive or preinvasive tumors showed overproduction of an atypical basement membrane material, which was present in irregular deposits but not found in the usual fixed relationship to the plasma membrane. This reaction might be related to an increased reaction to a membrane-bound antigen.

69-2711 KINETIC, ELECTROPHORETIC, AND CHROMATOGRAPHIC STUDIES ON GLUCOSE-ATP PHOSPHOTRANSFERASES IN RAT HEPATOMAS. (E.) Shatton, J. B. (Temple U. Sch. Med., Philadelphia, Pa.) H. P. Morris and S. Weinhouse. Cancer Res. 29(6):1161-1172, 1969.

Enzyme activities were studied in supernatant fractions from several transplanted hepatomas (Novikoff and Morris series) and several primary hepatomas (induced by 3'-methyl-4-dimethylaminoazobenzene, N-2-(4'-methyl)benzoylaminofluorene, N-2-florenyldiacetamide or aflatoxin B_1) from rats. The well-differentiated and highly differentiated hepatomas resembled normal rat liver in their patterns of hexokinase and glucokinase activities (low and low-to-moderate, resp.) and electrophoretic patterns of the 4 phosphotransferase isozymes (present) and hexokinase isozymes I, II and III (present). Starch gel electrophoresis showed glucokinase activity in all cases, although the activities varied from high (with a double band) to low (only the "slower" band was present). The poorly differentiated hepatomas differed from normal liver and the more differentiated hepatomas in showing high hexokinase activity, no detectable glucokinase activity, and traces of hexokinase isozyme IV. Faint bands of hexokinase isozyme IV were also seen in preparations from fetal rat liver; traces of this isozyme were seen in normal rat kidney and mammary gland, 2 primary mammary tumors (induced by 3-methylcholanthrene or 7,12-dimethylbenzanthracene), and 3 early-generation transplanted kidney tumors.

69-2712 DIFFERENTIATION OF THE THYMUS-LEUKEMIA (TL) ANTIGEN IN THE THYMUS OF MOUSE EMBRYOS. (E.) Schlesinger, M. (Hebrew U.-Hadassah Sch. Med., Jerusalem) and D. Hurvitz. Israel J. Med. Sci. 4(6):1210-1215, 1968.

The thymus-leukemia antigen (TLA) was demonstrated in embryonic thymus obtained from mice of TLA-positive strains (A, C58 and SJL/J), but was not found in other tissues from either embryonic or adult mice. TLA was seen in thymus tissues of 15.5-day-old embryos; in older embryos, the TLA level was often higher than in adult thymus. Since no TLA was found in thymus tissues from embryos of TLA-negative mouse strains (AKR/Cum, BALB/c, C3H/An, C57BL/6 or RIII/Jem), it was concluded that the appearance of TLA in leukemias that later develop in these strains does not result from an antigenic reversion to an embryonic state.

69-2713 THE ANTIGENIC STRUCTURE OF NEPHROBLASTOMAS. (E.) Linder, E. (U. Helsinki, Finland). Int. J. Cancer 4(2):232-247, 1969.

In rabbits immunized with preparations of either single tumors or pooled tumors from 13 children with nephroblastoma (Wilms' tumor), immunodiffusion and immunofluorescent examination of the resulting immune sera demonstrated no tumor-specific antigens. Double diffusion experiments uggested that the nephroblastomas were anti-enically simple. Antigenic differentiation was emonstrated in the morphologically differentiated arts of the tumor, and appeared during normal idney differentiation; however, the absence of 'Kidney-specific" brush border antigens showed hat antigenic differentiation did not proceed s far in the tumor as in the normally differen-iating kidney. Fetal antigens were found in he metanephrogenic mesenchyme of fetal kidney, ut not in the tumors. The synthesis of anti-enic membrane components seemed to be associated ith antigenic differentiation in both normal and alignant cells. It is concluded that these umors arise from cells which normally differen-iate into kidney structures.

9-2714 EFFECT OF TEMPERATURE ON THE LEVEL OF CHROMOSOMAL ABERRATIONS IN TUMOR CELL CULTURES. (Rus.) Kuz'mina, E. G. (Inst. Med. Radiol., USSR Acad. Med. Sci., Obninsk) and N. A. Poriadkova. Vop. Onkol. 15(3):39-45, 1969.

In cultures of HEp-2 human carcinoma cells, 24 hr. of exposure to a suboptimal temperature (17°C) increased the av. frequencies of chromosomal bridges or breaks from 3.6% and 9.0%, resp. (control cultures) to 5.3% and 15.1%, resp. A further increase in the frequencies of chromosomal aberrations was seen when the cultures were irradiated (50-200 r of X-rays, or 200 r of γ-irradiation) before cold exposure. Since the number of chromosomal abnormalities in each cell remained unchanged, it was concluded that the radiation-induced injuries followed the all-or-none principle. The results were interpreted as confirming the hypothesis that cancer cells contain latent genetic injuries, which can be transformed into visible changes (chromosomal aberrations) under certain environmental conditions.

69-2715 CYTOGENETIC ASPECTS OF CARCINOGENESIS. PRESENCE OF A MARKER CHROMOSOME IN STAGE 0 CARCINOMA OF THE UTERINE CERVIX. (Por.) Silviano Brandão, H. J. (Fac. Med., Ribeirao Preto, Brazil). An. Bras. Ginec. 67(3):133-141, 1969.

During mitosis, some of the tumor cells derived by biopsy from 5/5 pts. with carcinoma in situ (stained with hematoxylin) showed well-defined protrusions (2 microns or more), projecting in the form of a rod from the mitotic chromosomal complex, to which it appeared to be joined. Visible in both metaphase and anaphase, and sometimes in duplicate, the protrusion was thought to represent the projection of the longest arm of a very long marker chromosome, and resembled the structure seen in previously published studies of invasive carcinoma of the cervix.

69-2716 SEX CHROMATIN IN MALIGNANT TUMORS. (Ger.) Kallenberger, A. (U. Basel, Switzerland). Praxis 58(23):736-739, 1969.

Of 431 human breast cancers examined, 82 (19.0%; Group I) were sex chromatin (SC)-positive (single SC particles were present in over 30% of the nuclei); 80/431 (18.6%; Group II) were SC-poor (SC was present in 10-30% of the nuclei); 86/431 (19.9%; Group III) were SC-negative (SC was present in less than 10% of the nuclei); and 183/431 (42.5%; Group IV) showed several SC particles in over 20% of the nuclei. Loss of the SC particles (Groups II and III) or disruption of the normal SC composition (Group IV) was interpreted as a sign of cytological dedifferentiation; 17.7%, 23.0% and 43.0% of the undifferentiated tumors were found in Groups II, III and IV, resp. Disruption of the SC pattern was also a prognostically poor sign; 70% of the pts. in Groups III and IV showed regional metastases, compared to 46% of Group I, and the av. survival times in these pts. were 44.3 and 62.4 mo., resp. These differences in av. survival time were independent of the hormonal status of the pts.

69-2717 APPARENT REVERSAL OF X-CONDENSATION MECHANISM IN TUMORS OF THE FEMALE. (E.) Straub, D. G. (Mercy Hosp., San Diego, Calif.), L. A. Lucas, N. J. McMahon, O. L. Pellett and R. L. Teplitz. Cancer Res. 29(6):1233-1243, 1969.

In squash preparations of a malignant mesonephroma from a female pt., over 90% of the tumor cells were hyperploid (with a slight mode in the tetraploid range), with no loss in the C + X chromosome group. No X-chromatin bodies were noted in 1000 tumor epithelial cells, while the stroma in which the tumor was embedded (as well as the nonmalignant mesonephric epithelium) showed X-chromatin bodies in 20% of the cells. In a woman with adenocarcinoma of the colon who was heterozygous for glucose-6-phosphate dehydrogenase types A and B, X-chromatin bodies were seen in 10% of the tumor, whereas the stromal tissue and the normal colonic epithelium showed X-chromatin bodies in 30% of the cells. It is suggested that the condensation of the heteropyknotic X chromosome is not fixed and can be reversed in a malignant tumor. This process may be regarded as chromosomal dedifferentiation.

69-2718 VIRAL TRANSFORMATION OF CELLS. (E.) Bamford, S. B. (Tufts. U. Sch. Med., Boston, Mass.), G. W. Mitchell, R. Gilfillan and S. Mullick. Lancet 1(7594):579, 1969.

The relationship between the size of the late-replicating X chromosome in the WBC and the occurrence of premalignant and malignant tumors of the female genital tract and breast is discussed. Some persons with diseases associated with a high risk of such tumors (gonadal dysgenesis) also show 2 cell population types, in which the late-replicating X chromosome is larger or smaller than normal. It is suggested that cells with this abnormal chromosome may have been affected by environmental factors (such as a virus).

69-2719 AUTORADIOGRAPHIC STUDIES OF THE ABNORMAL CHROMOSOME IN HUMAN MALIGNANCIES. (E.) Goh, K. O. and E. Joiner. ORAU-Res. Rep. (107):99-102, 1968.

69-2720 FAMILIAL KAPOSI'S DISEASE (FATHER AND SON). (Fr.) Grupper, C. Bull. Soc. Franc. Derm. Syph. 75(6):768-771, 1968.

69-2721 LEUKEMIA AND AUTOIMMUNE DISEASES: SJÖGREN'S SYNDROME AND HEMOLYTIC ANEMIA ASSOCIATED WITH CHRONIC LYMPHATIC LEUKEMIA. (Fr.) Lehner-Netsch, G. (Saint-Sacrement Hosp., Quebec, Canada), A. Barry and J. M. Delage. Canad. Med. Ass. J. 100(24):1151-1154, 1969.

69-2722 HUMAN TUMOR-SPECIFIC ANTIGENS. (E.) Hellström, I. (U. Washington Med. Sch., Seattle), G. E. Pierce and K. E. Hellström. Surgery 65(6):984-989, 1969.

69-2723 AUTORADIOGRAPHIC ANALYSIS OF PROTEINS SYNTHESIZED BY HUMAN LYMPHOCYTES. I. MULTIPLE MYELOMA AND MACROGLOBULINAEMIA: EVIDENCE RELEVANT TO CLONAL SELECTION THEORY. (E.) Forbes, I. J. (Queen Elizabeth Hosp., Woodville, South Australia) and J. M. W. Lawton. Aust. Ann. Med. 18(1):12-18, 1969.

69-2724 AUTORADIOGRAPHIC ANALYSIS OF PROTEINS SYNTHESIZED BY HUMAN LYMPHOCYTES. II. CHRONIC LYMPHATIC LEUKAEMIA, LYMPHOMA AND LYMPHOSARCOMA, HODGKIN'S DISEASE, RETICULUM CELL SARCOMA AND INFECTIOUS MONONUCLEOSIS. (E.) Lawton, J. M. W. (Roy. Adelaide Hosp., Australia) and I. J. Forbes. Aust. Ann. Med. 18(1):19-25, 1969.

69-2725 FIBROADENOMA PHYLLOIDES: STUDY OF ITS HISTOGENESIS AND MALIGNANT TRANSFORMATION. (Por.) Cortez Pimentel, J. (Fac. Med., Lisbon). J. Soc. Cienc. Med. Lisboa 133(4):265-283, 1969.

69-2726 MEROZYGOTIC PROCESSES, MICROORGANISMS, AND NEOPLASTIC ETIOLOGY. (E.) Hadley, H. G. (Res. Found., Inc., Washington, D. C.). Yokohama Med. Bull. 19(4):109-114, 1968.

69-2727 RECKLINGHAUSEN'S NEUROFIBROMATOSIS. CLINICAL EVIDENCE FROM 5 PEDIATRIC CASES. (It.) Pistone, F. M. (U. Genoa, Italy), F. Cottafava, S. Bianchedi, E. Bertolotti and M. L. Grossi-Bianchi. Minerva Pediat. 21(11):454-464, 1969.

AUTHOR INDEX

Abad, R. S. 2678
Acuff, M. 2570
Adachi, K. 2555
Aderca, I. 2642
Aikat, B. K. 2565
Alexander, P. 2510
Altstein, A. D. 2643
Aoki, T. 2601
Araki, M. 2530
Archer, F. L. 2591
Archer, V. E. 2522,2524
Areosa, J. 2684
Arseculeratne, S. N. 2587
Auerbach, O. 2545
Axelrad, A. A. 2598

Baba. K. 2614
Balmuṣ, G. 2631,2632
Băluṣ, L. 2520
Bamford, S. B. 2718
Bandunatha, C. H. S. R. 2587
Barat, N. 2629
Barendsen, G. W. 2700
Barrientos, E. 2693
Barry, A. 2721
Bauer, D. H. 2585
Bauer, H. 2609
Baylor, C. H. 2540
Becerra Caballero, O. 2693
Benasco Naval, C. 2681,2682
Benjamin, E. S. 2526
Berenblum, I. 2518,2519
Berman, L. D. 2616
Bertin, B. A. 2603
Bertolotti, E. 2727
Bianchedi, S. 2727
Biancifiori, C. 2543,2544
Bierwolf, D. 2627
Bigotto, M. R. 2654
Biriulina, T. I. 2621
Bisbini, P. 2654
Black, L. M. 2625
Black, P. H. 2615
Blair, N. 2517
Blanchard, R. L. 2524
Blanzat-Reboud, S. 2575
Boiron, M. 2630
Bosmann, H. B. 2617
Boyce, W. H. 2667
Brailovsky, C. A. 2616
Briziarelli, G. 2572
Bruze, M. 2533
Bryan, G. T. 2550
Bucciarelli, E. 2543,2544
Buell, P. E. 2672
Bühler, E. M. 2509
Burns, W. H. 2615
Burstein, S. 2581
Busatti, L. 2655
Butler, M. P. 2697
Bykovski, A. F. 2643

Calvo de Mora, S. 2683,2684
Cameron, H. MacD. 2691
Camus, G. 2604
Capps, W. I. 2628
Carpenter, C. P. 2534
Cass, A. S. 2667
Ceglowski, W. S. 2599
Cernicanu, D. 2520
Cha, J. W. 2554
Chany, Ch. 2616
Chapman, W. L. 2515
Chen, L. 2518, 2519
Cherry, J. 2698
Chirigos, M. A. 2597
Chiu, Ren-Jong 2625
Chomet, B. 2546
Christian, G. 2555
Chung, D. H. 2692
Cirenei, F. 2705
Cirures, A. 2520
Ciufecu, E. 2631,2632
Clark, R. L. 2514
Conney, A. H. 2539
Conti, E. 2655
Corradi, G. 2670
Correll, N. 2546
Cortez Pimentel, J. 2725
Cottafava, F. 2727
Covarrubias C., J. H. 2688
Cowles, C. A. 2593
Cox, C. E. 2667

Darlington, R. W. 2636
Darte, J. M. M. 2662
Dawson, P. J. 2596
De Grandis, C. 2655
De Groc, J. 2671
Delage, J. M. 2721
Delain, E. 2604
De Silva, L. M. 2587
De-Thé, G. 2607
De Torres, R. A. 2647
Diad'kova, A. M. 2610
Di Guglielmo, R. 2706
Dmitriev, V. N. 2574
Dmochowski, L. 2514
Dodonova, N. N. 2643
Dominici, L. M. 2654
Donaldson, A. W. 2495
Dörken, H. 2664
Dubbs, D. R. 2647
Duke, G. A. 2549
Dunn, J. E. 2672
Duperrat, B. 2588
Dux, A. 2590

Ebbesen, P. 2499
Ebert, P. S. 2597
Ellsworth, P. A. 2597
Ellsworth, R. M. 2704
Emanoil-Ravicovitch, R. 2630

Erickson, R. R. 2561
Escalonilla, F. 2683,2684

Fabrikant, J. I. 2698
Fadda, G. 2595
Fankhauser, R. 2694
Fernan Zegarra, L. 2693
Fieldsteel, A. H. 2596
Fingerhut, B. 2697
Fink, M. A. 2593
Finklestein, J. Z. 2639
Finster, M. 2539
Firez, A. 2668
Fisher, H. L., Jr. 2525
Fogel, M. 2619
Follmann, E. 2703
Forbes, I. J. 2723,2724
France, L. H. 2656
Friedman, H. 2599
Frithiof, L. 2710
Fukuda, A. 2633

Ghezzi, I. 2541
Gilfillan, R. 2718
Glover, E. L. 2536
Goetschel, G. 2588
Goh, K. O. 2589,2719
Golden, R. L. 2634
Gommi, B. W. 2539
Gordon, W. 2526
Gottlieb, S. K. 2513
Graf, T. 2609
Graff, S. 2697
Graham, J. B. 2678
Grande, J. 2551
Granoff, A. 2636
Graser, F. 2502
Green, M. 2638
Gregoriades, A. 2626
Grossi-Bianchi, M. L. 2727
Grote, W. 2657,2658
Groves, G. F. 2603
Gruenstein, M. 2570,2571
Grumbmann, M. R. 2586
Grupper, C. 2720
Guidi, G. 2706
Gustowski, A. 2686
Gutmann, H. R. 2561

Hadley, H. G. 2726
Haight, C. 2494
Hamburger, J. I. 2690
Harap, E. 2520
Hardy, D. A. 2622
Harrison, Y. E. 2539
Hartley, J. W. 2628
Hasse-Berlin, W. 2660
Hayami, M. 2633
Head, J. 2546
Hecker. E. 2527
Hellström, I. 2722
Hellström, K. E. 2722

Heppner, G. H. 2611
Hermens, A. F. 2700
Hillemanns, H. G. 2507
Hirt, B. 2650
Hodes, M. E. 2517
Holaday, D. A. 2521,2522
Holma, B. 2538
Hotta, S. 2623
Hozoc, M. 2631,2632
Hozumi, M. 2558
Hrushovetz, S. B. 2696
Hsiung, G. D. 2635
Huebner, R. J. 2601,2608,2628
Huertas Tejada, G. 2693
Hurvitz, D. 2712

Ichikawa, Y. 2582
Iftimovici, 2642
Irlin, I. S. 2618,2620,2621
Ishikawa, K. 2673
Ito, M. 2568

Jasmin, G. 2554
Javadpour, N. 2666
Jenkin, R. D. T. 2662
Jenkins, R. S. 2679
Jensen, F. C. 2645
Joiner, E. 2719
Justh, G. 2701
Just-Viera, J. O. 2494

Kahle, P. 2562
Kaiser, R. 2504
Kallenberger, A. 2716
Kanaar, P. 2516
Kanka, J. 2680
Kantor, S. 2674
Kaplan, A. S. 2649
Kaplow, L. S. 2635
Karasaki, S. 2564
Kasperowicz, Z. 2686
Kaštelan, S. 2652
Kato, R. 2533
Kawazoe, Y. 2530
Kessel, H. 2562
Khaletskaia, F. M. 2553
Kiessling, J. 2663
Kihlman, B. A. 2532
Kinnman, J. E. G. 2692
Kiselev, N. A. 2651
Kit, S. 2647
Klaiber, M. S. 2571
Klug, A. 2651
Knight, S. C. 2622
Kobune, F. 2633
Koldovsky, P. 2595
Kolesnichenko, T. S. 2548
Kondo, M. 2566
Kondrat'eva, A. F. 2496
Koniukhov, A. F. 2602
Konovalova, N. P. 2618
Koprowski, H. 2645
Krajtmajer, G. 2528
Kröger, H. 2562
Küpferling, E. 2675
Kurimura, T. 2647
Kurohara, S. S. 2678
Kutinová, L. 2641
Kuz'mina, E. G. 2714
Kuznetsov, O. K. 2610
Kuznetsova, L. E. 2529

Labas, Z. 2709
Lacour, F. 2604
Laine, F. 2708
Larsen, C.-J. 2630
Laskowski, T. Z. 2689
Lawton, J. M. W. 2723,2724
Leclerc, J.-C. 2594
Lee, B. C. 2692
Lee, B. K. 2537
Lee, D. J. 2585
Lee, Y. T. 2692
Lehner-Netsch, G. 2721
Leighton, J. 2701
Levy, J.-P. 2594
Linder, E. 2713
Ling, N. R. 2622
Liombart, A., Jr. 2576
Lipkovic, P. 2687
Lloyd, W. 2522
Log, Tze-Siung, R. J. 2608
Lombardi, G. 2654
Lorenzo Valles, J. 2684
Love, L. 2665
Lucas, L. A. 2717
Ludwig, A. S. 2508
Luginbühl, H. 2694
Lundin, F. E., Jr. 2522
Lungu, M. 2631,2632
Lusignani, A. 2572

Makino, S. 2623
Malinin, G. I. 2597
Maltzeff, N. 2559
Malý, E. 2528
Maranzana, P. 2541
Marcozzi, G. 2512
Marhold, J. 2583
Marinuzzi, A. 2653
Mark, R. 2701
Matarazzo, R. 2670
Mateu-Aragonés, J. M. 2685
Matrka, M. 2583
Mattosinho França, L. C. 2707
May-Levin, F. 2604
Mazurenko, N. P. 2602
McAllister, R. M. 2639
McFarlane, E. S. 2613
McGrath, J. T. 2694
McGrew, E. A. 2546
McMahon, N. J. 2717
Mellors, R. C. 2601
Mendoza Valcarcel, L. 2693
Menz, H.-P. 2569
Meranze, D. R. 2570,2571
Micheel, B. 2627
Mikhailov, V. Ia. 2676
Milner, J. E. 2557
Mita, T. 2530
Mitchell, G. W. 2718
Miyawaki, H. 2612
Mody, J. K. 2578
Monneron, A. 2563
Monsiorski, J. 2686
Mori, K. 2566
Morris, H. P. 2711
Morton, J. I. 2600
Moscovici, C. 2606
Moscovici, M. G. 2606
Mostofi, F. K. 2666
Mühlbock, O. 2590
Mullick, S. 2718
Müntener, M. 2511
Murakami, T. 2566
Murphy, G. 2537
Mutchnik, D. L. 2689

Nadel, E. M. 2581
Nadtochey, G. A. 2643
Nagai, S. 2584
Nagayo, T. 2568
Nakakuki, K. 2612
Nars, P. W. 2509
Nastac, E. 2631,2632
Naujoks, H. 2506
Neher, G. H. 2600
Neumann, H. A. 2665
Nishimura, R. 2549
Nishizuka, Y. 2612
Noble, J. G., Jr. 2581
Nosny, P. 2708
Novak, G. M. 2665

O'Brien, R. L. 2644
O'Conner, T. E. 2593
Odashima, S. 2567,2580
Ogino, T. 2614
Ohta, A. 2566
Old, L. J. 2626
Onaka, M. 2614
Oort, J. 2516
Oppenheim, E. 2594
Østergaard, E. 2505
Overbeck, W. 2659
Oxford, J. S. 2637

Padovec, J. 2680
Palao De Torres, J. 2693
Palao Villegas, M. 2693
Paran, M. 2582
Paredes, C. 2576
Parker, H. M. 2523
Parkhomenko, I. I. 2618
Peacock, P. R. 2543,2544
Pedrali, C. 2572
Pellett, O. L. 2717

lin, L. 2675
nis, B. 2541
ers, M. V. 2662
rce, G. 2611
rce, G. E. 2722
a, M. 2638
alóvá, J. 2583
kin, G. E. 2549
tone, F. M. 2727
tonova, G. M. 2547
ss, G. B. 2552
osiants, E. E. 2547
nke, B. 2577
li, E. 2503
p, S. 2668
pers, P. J. 2539
iadkova, N. A. 2714
ter, C. W. 2637
stogarova, G. A. 2560

ber, M. D. 2536
chart, R. M. 2508
driquez-Soriano, J. A. 2682
ner, F. 2657
thig, W. 2542
usselet, G. 2588
we, W. P. 2628
żewicki, S. 2577
zman, C. 2579
ssfield, A. G. 2575

avedra Virhuez, P. 2693
ccomanno, G. 2524
chs, L. 2582,2619
ez-Serrania, J. 2579
gner, Z. 2583
hnazarov, N. 2642
kakura, T. 2612
muel, I. 2632
nder, J. 2569
nford, K. 2702
nvito, W. L. 2707
rma, P. S. 2608
hlegel, J. U. 2549
hlesinger, M. 2712
hmalhorst, W. R. 2689
hmauss, A. K. 2675
hoental, R. 2498
hweinsberg, F. 2569

Scott, R., Jr. 2689
Seifert, G. 2500
Sendov, B. 2695
Sengupta, P. 2565
Shamberger, R. J. 2573
Shatton, J. B. 2711
Shear, M. J. 2497
Shiffer, I. V. 2699
Shimkin, M. B. 2570,2571
Shimono, H. 2649
Shisa, H. 2612
Shklar, G. 2556
Shullenberger, C. C. 2603
Sibal, L. R. 2593
Siegel, B. V. 2600
Siegel, W. V. 2556
Silviano Brandão, H. J. 2715
Simić, B. 2528
Sinkovics, J. G. 2603
Sinnhuber, R. O. 2585
Sirtori, C. 2493,2501
Slavin, G. 2691
Smith, D. B. 2679
Smith, E. M. 2522
Sonley, M. J. 2662
Spigliati, P. 2655
Stanfield, L. L. 2693
Stemmermann, G. N. 2687
Stephens, C. A. 2662
Stoian, M. 2631
Sturelid, S. 2532
Subrt, I. 2680
Suskind, R. R. 2555
Suzuki, H. 2568
Szanto, P. B. 2665

Tachibana, M. 2530
Tai, H. T. 2644
Takahashi, M. 2614
Takeda, M. 2624
Takehara, M. 2623
Tambourin, P. 2629
Tamura, M. 2566
Tegner, Y. 2533
Teixeira, J. 2669
Teplitz, R. L. 2717
Ter-Grigorov, V. S. 2620,2621
Thatcher, D. 2570
Thomson, S. 2598
Töndury, G. 2511
Trainin, N. 2518
Trávníček, M. 2605
Tsanev, R. 2695
Tsysina, E. I. 2621
Tubio, J. 2683,2684
Turano, A. 2595
Turner, H. C. 2608

Valaitis, J. 2546
Veenema, R. J. 2697
Vigliani, E. C. 2541
Vilar Dominguez, E. 2684
Von Der Oelsnitz, G. 2661
Vonka, V. 2641

Weaver, N. K. 2540
Weil, C. S. 2534
Weinhouse, S. 2711
Weinstein, D. 2646
Weir, J. M. 2672
Weiss, M. C. 2648
Welch, R. M. 2539
Wendling, F. 2629
Wijesundera, S. 2587
Wildner, G. P. 2663
Williams, E. H. 2677
Williams, S. N. 2586
Winkelstein, W., Jr. 2674
Winter, D. 2631,2632
Wivel, N. A. 2593
Woessner, S. 2579
Wolf, A. 2592

Yamada, S. 2568
Yamanouchi, K. 2633
Yamasawa, S. 2555
Yip, L. C. 2517
Yu, P. L. 2517

Zajdela, F. 2629
Zamarriego, J. 2683,2684
Zanetti, M. 2606
Zasypka, A. T. 2535
Závadová, H. 2641
Zetterberg, G. 2531
Zur Hausen, H. 2640

SUBJECT INDEX

ABNORMALITIES, CONGENITAL
  XO/XY sex chromosome mosaicism, gonadal tumor risk, review: 2509
2-ACETYLAMINOFLUORENE (See N-2-Fluorenylacetamide)
ADJUVANTS
  Freund's, effect on virus tumors, mouse or rat: 2621
ADRENAL NEOPLASMS
  induction, dimethylbenzanthracene, mouse: 2578
AFLATOXIN(S)
  food hepatoma, Uganda (West Nile District): 2677
  induction of helical polysomes, rat liver: 2563
  production, coconut medium: 2587
  toxicity, swine: 2586
    trout: 2585
AGING
  host immunity against cancer, review: 2510
AIR
  3,4-benzfluoranthene, analysis, method: 2528
AIR POLLUTION
  lung cancer, asbestos bodies, Italy (Perugia): 2543,2544
  particulate, respiratory cancer, New York (Buffalo): 2674
    stomach cancer, New York (Buffalo) ethnic groups: 2674
ANTHRANILIC ACID DERIVATIVES (tryptophan metabolites)
  bladder tumors, mouse: 2550
ANTHRANILIC ACID, 3-HYDROXY- (tryptophan metabolite)
  mutagenesis, human embryonic cells: 2529
  urine, bladder cancer and smokers, effect of ascorbic acid: 2549
ANTIBIOTICS
  chloramphenicol, leukemia, human: 2589
ANTITUMOR AGENTS
  actinomycin D, effect on normal and Friend virus-infected mouse erythropoietic tissue: 2629
  cycloheximide, effect on SV40 DNA, monkey cells: 2647
ARSENIC
  analysis, American cigarettes: 2537
  effect on methylcholanthrene skin tumors, mouse: 2557
  skin cancer, human: 2588
ASBESTOS
  inclusion bodies, lung cancer, Italy (Perugia): 2543,2544
  occupational exposure, lung or pleural tumors, northern Italy: 2541
AZO DYES
  oxidation, mechanism: 2583
AZOBENZENE, 3'-METHYL-4-DIMETHYLAMINO-
  liver tumors, immunity, intact or splenectomized rat: 2565
AZOBENZENE, 3'-METHYL-4-MONOMETHYLAMINO-
  N-demethylase, placental, smokers: 2539
AZOBENZENE, N,N'-DIMETHYL-4-AMINO-
  liver tumors, pathogenesis, rat: 2564
BENZANTHRACENE, 7,12-DIMETHYL-
  adrenal tumors, mouse: 2578
  cheek pouch tumors, effect of triamcinolone or dimethyl sulfoxide, hamster: 2556
  chromosome breaks, hamster bone marrow: 2533
  effect on hydroxyaminoquinoline oxide skin tumors, mouse: 2558
  g.i. and liver tumors, rat: 2567
  leukemia, susceptibility, mammary tumor virus-infected AKR mice: 2612
  mammary tumors
    dose-response relationship, rat: 2570
    effect of hypothalamic injury or oophorectomy, rat: 2571
    estrogen-induced or spontaneous secretion, ultrastructure, rat: 2591
    lysosomal enzymes during regression, rat: 2573
    steroid content, rat: 2572
BENZENE
  occupational exposure, erythroleukemia: 2579
3,4-BENZFLUORANTHENE
  analysis, air, method: 2528
BENZIDINE
  hapten component, rat serum and tissues: 2535
BENZOQUINOLINE-69 (synthesized from β-naphthylamine)
  liver and s.c. tumors, rat and mouse: 2553
3,4-BENZPYRENE
  bladder tumors, mouse or rat: 2551
  cervicitis, effect of estrogen and podophyllin derivatives, hamster: 2576
  hydroxylase, placental, effect of cigarette smoke, rat and human: 2539
  premalignant mammary hyperplasia, effect of androgen or light exposure, mouse: 2574
  skin tumors, hexokinase, mouse: 2555
BLADDER CARCINOGENESIS
  benzpyrene, mouse or rat: 2551
  methylcholanthrene, mouse or rat: 2551
  β-naphthylamine, dog: 2552
  tryptophan metabolites, mouse: 2550
BLADDER NEOPLASMS
  epidemiology
    children and adolescents, U.S., smoking: 2666
    North Carolina (rural): 2667
  RNA localization, comparison to normal tissue, rat or human: 2697
  schistosomiasis, Malagasy Republic (Majunga region): 2708
  tryptophan metabolite formation, effect of ascorbic acid, human: 2549
BLOOD
  groups, ABO and Rh, gallbladder cancer, Germany (Berlin): 2675
  serum, antigenic component, benzidine-treated rat: 2535
BONE MARROW
  chromosomes, effect of dimethylbenzanthracene, hamster: 2533
BONE NEOPLASMS
  ameloblastoma of jaw, epidemiology, Africa (Tanzania and Uganda): 2691

ONE NEOPLASMS (Contd.)
  epidemiology, Peru (Arequipa Province): 2693
  jaw tumors, epidemiology, Korea: 2692
RAIN NEOPLASMS (See also under Nervous system neoplasms)
  brain stem spongioblastoma, adolescent with transformed colon polyposis: 2707
  frequency, children: 2657
  metastatic, frequency, Switzerland (Geneva): 2656
  spontaneous, domestic animals, cases and review: 2694
REAST NEOPLASMS (See under Mammary neoplasms, human)
RONCHUS NEOPLASMS
  epidemiology
    Brazil (Rio de Janeiro): 2669
    Rumania (Oradea), smoking: 2668

ARCINOGENESIS, CHEMICAL
  benzidine, antigenic components of serum and tissues, rat: 2535
  historical review: 2497
  enhancement by radiation, review: 2496
  host immunity and aging, review: 2510
ARCINOGENS, CHEMICAL
  chronic toxicity studies, testing methods: 2534
ELL GROWTH KINETICS
  human cancer, measurement: 2701,2702
  larynx cancer: 2698
  liver carcinogenesis, mathematical model: 2695
  method of determination, mouse tumor: 2696
  radiation effects, mouse tumor or normal cells: 2699
  untreated or irradiated radiation-induced rat sarcoma: 2700
ERVIX UTERI
  benzpyrene cervicitis, effect of estrogen and podophyllin derivatives, hamster: 2576
  recurrent polyps, cancer frequency: 2686
ERVIX UTERI NEOPLASMS
  adenocarcinoma, epidemiology: 2678
  carcinoma in situ, marker chromosomes: 2715
  contraceptives, review: 2505,2506
  epidemiology
    Georgia (Atlanta), cluster, possible venereal transmission: 2679
    Italy (Trieste): 2653
    review: 2507
    Spain (Barcelona): 2685
      (Madrid): 2683
  induction, methylcholanthrene, hormone effects, mouse: 2575
  malignant transformation of cervical polyps, frequency: 2686
  screening methods: 2680,2681,2682,2684
CHLORAMPHENICOL
  acute leukemia, human: 2589
CHROMOSOMES
  abnormalities, human cancer: 2719
    review: 2513
  dimethylbenzanthracene-induced breakage, hamster bone marrow: 2533
  effect of
    carcinogenic tryptophan metabolites, human embryonic cells: 2529

CHROMOSOMES (Contd.)
    LSD, plant or mammalian (hamster or human) cells: 2532
  female genital tumors, review: 2508
  markers, cervix carcinoma in situ: 2715
  sex
    breast cancer: 2716
    late-replicating X, cancer risk: 2718
    mesonephroma or colon tumor, women: 2717
    XO/XY mosaicism, gonadal tumors, review: 2509
  SV40-transformed human cells (W18 VA2): 2646
  temperature and radiation effects, human cancer cells: 2714
COCARCINOGENS (CHEMICAL)
  isolation (plants of family Euphorbiaceae) and properties of croton oil fractions: 2527
COLON
  polyposis with malignant degeneration, associated brain tumor, adolescent: 2707
COLON NEOPLASMS
  relationship to polyposis, review: 2512
  sex chromosomes, woman: 2717
CONTRACEPTIVES (See under Hormones)
CORPUS UTERI NEOPLASMS
  endometrium cancer, etiology, review: 2504
  epidemiology, Italy (Trieste): 2653
  induction, methylcholanthrene, hormone effects, mouse: 2575
  malignant transformation of cervical polyps, frequency: 2686
CROTON OIL
  isolation (plants of family Euphorbiaceae) and properties of cocarcinogenic substances: 2527

DIMETHYL SULFOXIDE
  effect on
    dimethylbenzanthracene tumors, hamster cheek pouch: 2556
    hydroxyaminoquinoline oxide skin tumors, mouse: 2558
  enhancement of "out-of-strain" leukemia, guinea pig: 2581
DISEASE TRANSMISSION
  venereal, possible, cervix cancer: 2679

EAR DUCT NEOPLASMS
  induction, nitrosobutylurea, rat: 2580
ENDOCRINE ABLATION
  hypothalamic injury or oophorectomy, effect on dimethylbenzanthracene mammary tumors, rat: 2571
ENDOMETRIUM (See under Corpus uteri)
ENVIRONMENTAL FACTORS
  light exposure, effect on benzpyrene-induced premalignant mammary hyperplasia, mouse: 2574
ENZYMES
  alkaline phosphatase, liver, bioassay of radiation leukemia-protective factor, mouse: 2517
  aminoazo dye N-demethylase, placenta, smoking, human: 2539

- ENZYMES (Contd.)
  - Δ-aminolevulinic acid synthetase, liver and spleen, virus-induced polycythemia, mouse: 2597
  - benzpyrene hydroxylase, placenta, smoking, rat and human: 2539
  - catalase, liver, Mazurenko virus-induced leukemia, mouse: 2602
  - DNA polymerase or thymidine kinase, adenovirus-infected cells: 2638
  - glucose-ATP phosphotransferases, kidney, liver and mammary tumors, rat: 2711
  - glycosidases, SV40- or polyoma virus-transformed cells: 2617
  - hexokinase, benzpyrene skin tumors, mouse: 2555
  - lactate dehydrogenase, liver, bioassay of radiation leukemia-protective factor, mouse: 2517
  - lysosomal, regressing dimethylbenzanthracene-induced mammary tumors, rat: 2573
  - transfer RNA methylase, properties, adenovirus 12-induced hamster tumor: 2613
- EPIDEMIOLOGY
  - all tumors
    - aged, Italy (Sulmona): 2655
    - Italy (Trieste): 2653
    - San Marino: 2654
    - Yugoslavia (Split): 2652
  - ameloblastoma of jaw, Africa (Tanzania and Uganda): 2691
  - bladder cancer
    - children and adolescents, U.S., smoking: 2666
    - North Carolina (rural): 2667
    - schistosomiasis, Malagasy Republic (Majunga region): 2708
  - bone tumors, Peru (Arequipa Province): 2693
  - brain tumors, children: 2657
  - breast cancer, Hawaii, ethnic groups (Japanese): 2687
  - bronchogenic carcinoma in situ, screening of asymptomatic smokers: 2546
  - cervix cancer
    - adenocarcinoma: 2678
    - contraceptives, review: 2506
    - Czechoslovakia (Prague): 2680
    - Denmark, contraceptives, review: 2505
    - Georgia (Atlanta), cluster, possible venereal transmission: 2679
    - review: 2507
    - screening methods: 2680,2684
    - Spain (Barcelona): 2685
      - (Madrid): 2683
  - gallbladder cancer, blood groups (ABO and Rh), Germany (Berlin): 2675
  - hepatoma, Uganda (West Nile District), aflatoxin-contaminated foods: 2677
  - Hodgkin's disease, sex ratio worldwide: 2664
  - jaw tumors, Korea: 2692
  - kidney tumors, adolescence: 2665
  - leukemia, aged, review: 2503
  - lung cancer
    - asbestos bodies, Italy (northern): 2541
      - (Perugia):2543,2544
    - Brazil (Rio): 2669
    - France(Bordeaux): 2671

- EPIDEMIOLOGY, (Contd.)
    - petroleum asphalt workers, U.S.: 2540
    - Rumania (Oradea), smoking: 2668
    - sex difference: 2670
    - uranium miners: 2521
      - U.S., review: 2495
        - smoking, ethnic groups: 2522
  - mediastinal tumors, children: 2660
  - metastatic brain tumors, Switzerland (Geneva): 2656
  - mouth and pharynx cancer, smoking, California: 2672
  - neck tumors, Germany (Freiburg): 2659
  - oral cavity tumors, children, review: 2500
  - pancreas cancer, USSR(Omsk): 2676
  - penis cancer, Peru (Cuzco), ethnic groups (Indians): 2688
  - pleural mesothelioma, asbestosis, Italy (northern): 2541
  - primary liver tumors, children, review: 2502
  - prostate cancer, Texas (Houston), aged: 2689
  - respiratory cancer, air pollution, New York (Buffalo): 2674
    - San Marino, comparison to Italy: 2654
  - skin cancer, petroleum asphalt workers, U.S.: 2540
  - spinal tumors, children: 2658
  - spontaneous nervous system tumors, domestic animals, cases and review: 2694
  - stomach cancer, air pollution, New York (Buffalo), ethnic groups: 2674
  - superficial stomach cancer, Japan: 2673
  - thymus tumors, children: 2661
  - thyroid cancer, Michigan (Detroit): 2690
- EPSTEIN-BARR VIRUS (See under Virus, herpes-type)
- ESOPHAGUS
  - achalasia, cancer frequency, review: 2494
- ESOPHAGUS NEOPLASMS
  - achalasia, review: 2494
  - induction
    - dimethylbenzanthracene + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
    - nitroquinoline oxide + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
    - "spontaneously" formed nitrosamines in stomach, rat: 2569
- ETHNIC GROUPS
  - breast cancer, Hawaiian Japanese: 2687
  - lung cancer, uranium miners, smoking, U.S. (Indians): 2522
  - penis cancer, Peru (Cuzco), Indians: 2688
  - stomach cancer, air pollution, New York (Buffalo), Polish immigrants: 2674
- EYE NEOPLASMS
  - retinoblastoma, genetics: 2704

- N-2-FLUORENYLACETAMIDE, N-HYDROXY-
  - metabolism, enzymatic, rat liver in vitro: 2561
- N,N'-(2,7-FLUORENYLENE)BISACETAMIDE
  - g.i. and liver tumors, rat: 2567

OODS
- aflatoxin-contaminated peanuts, hepatoma, Uganda (West Nile District): 2677

ALLBLADDER NEOPLASMS
- ABO and Rh blood groups, Germany (Berlin): 2675

ASTROINTESTINAL CARCINOGENESIS
- dimethylbenzanthracene + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
- hydroxyaminoquinoline oxide, mouse: 2566
- nitroquinoline oxide, effect of salivary gland removal, rat: 2568
  - + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
- nitrosamines, mechanism: 2569
- nitrosobutylurea, rat: 2580

ASTROINTESTINAL DISEASES
- intestinal polyposis, malignant transformation, review: 2512

ASTROINTESTINAL NEOPLASMS
- CNS metastases, frequency: 2656
- epidemiology, San Marino: 2654
- lymphoma, frequency, children: 2662

ENETICS, ANIMAL
- Friend leukemia virus resistance: 2596
- Gross leukemia virus and immunity disorders, NZB mouse strain: 2601
- leukemia virus-positive mouse strain (AKR), mammary tumor virus interference: 2612

GENETICS, CELLULAR
- latent damage, method of exposure, human cancer cells: 2714

GENETICS, HUMAN
- intestinal polyposis with malignant transformation, review: 2512
- Kaposi's sarcoma, father and son: 2720
- melanoma from traumatized nevi, siblings: 2705
- retinoblastoma transmission: 2704
- Von Recklinghausen's neurofibromatosis, malignant transformation, child: 2727
- xeroderma pigmentosum, skin carcinoma and fibrosarcoma, radiation exposure: 2516

GENITAL NEOPLASMS
- frequency, aged, Italy (Sulmona): 2655
- gonadal tumors, XO/XY sex chromosome mosaicism, review: 2509

GENITAL NEOPLASMS, FEMALE
- chromosomes, review: 2508
- CNS metastases, frequency: 2656
- contraceptives, review: 2505,2506
- epidemiology, San Marino: 2654
- late-replicating X chromosome, possible viral transformation: 2718

HALLUCINOGENS
- LSD, effect on chromosomes, mammalian (hamster or human) or plant cells: 2532
  - mutagenesis, fungi: 2531

HEAD AND NECK NEOPLASMS
- neck tumors, epidemiology, children, Germany (Freiburg): 2659

HEMATOPOIESIS
- erythropoiesis, actinomycin effect, normal or Friend virus-infected mouse: 2629

HORMONES
- ACTH and dexamethasone, enhancement of "out-of-strain" leukemia, guinea pig: 2581
- androgen, effect on benzpyrene-induced premalignant mammary hyperplasia, mouse: 2574
- contraceptive, cervix cancer, review: 2505, 2506
- estrogen
  - effect on benzpyrene cervicitis, hamster: 2576
    - methylcholanthrene-induced female genital tumors, mouse: 2575
    - secretion, dimethylbenzanthracene-induced mammary tumor, rat: 2591
- metabolic disorders, endometrial cancer etiology, review: 2504
- pituitary graft, mammary tumors, mouse: 2590
- production, methylcholanthrene-induced ovary tumors, effect of pregnancy and lactation, rabbit: 2577
- progestational, effect on methylcholanthrene-induced female genital tumors, mouse: 2575
- steroid, analysis, dimethylbenzanthracene-induced mammary tumors, rat: 2572

IMMUNITY
- abnormal immunoglobulin patterns, human leukemia and lymphoma: 2724
  - myeloma and related diseases: 2723
- adjuvant effect on polyoma or Rous virus tumors, mouse or rat: 2621
- antigen complexes, serum and tissues, benzidine-treated rat: 2535
- antigenic differentiation, Wilms' tumor (nephroblastoma), child: 2713
- avian leukosis viruses, envelope antigenic determinants: 2609
- cell surface antigens, Graffi virus-induced mouse leukemia: 2627
- changes with aging, cancer development, review: 2510
- histocompatibility, extracts of virus-free lymphoma, mouse: 2592
- methylcholanthrene sarcoma, mouse: 2559
- methyldimethylaminoazobenzene liver tumors, intact or splenectomized rat: 2565
- polyoma virus-induced tumors, rabbit: 2620
- Rous sarcoma virus, pigeon: 2608
- T antigen, SV40-transformed human-mouse hybrid cells: 2648
- thymus leukemia antigen, differentiation, mouse embryo: 2712
- tumor-specific antigens
  - avian adenovirus (CELO)-induced hamster tumor: 2637
  - Harvey virus-induced mouse sarcoma: 2575
  - human cancer: 2722
  - mouse mammary tumor: 2611

IMMUNITY DISORDERS
- autoimmune (Sjögren's syndrome and autoimmune hemolytic anemia), with chronic leukemia: 2721
- genetic, possible role of Gross leukemia virus, NZB mouse: 2601
- lupus vulgaris, spindle cell sarcoma of lupus scar: 2526

- IMMUNITY DISORDERS (Contd.)
  - pathogenesis of myeloma and related diseases: 2706
- IMMUNOSUPPRESSION
  - Friend leukemia virus, mouse: 2599
  - Rauscher leukemia virus, mouse: 2600
- INJURIES (See also under Scar tissue)
  - esophagus, achalasia, cancer frequency, review: 2494
  - skin, melanoma from traumatized nevus, siblings: 2705
- INTERFERON
  - production, effect of SV40 or carcinogen transformation, rat embryo cells: 2616

- KIDNEY CARCINOGENESIS
  - dimethylnitrosamine, tumor ultrastructure, rat: 2554
- KIDNEY NEOPLASMS
  - enzyme patterns, rat: 2711
  - epidemiology, adolescence: 2665
  - Wilms' tumor (nephroblastoma), antigenic differentiation, child: 2713
- KYNURENINE DERIVATIVES (tryptophan metabolites)
  - bladder tumors, mouse: 2550
- KYNURENINE, 3-HYDROXY- (tryptophan metabolite)
  - mutagenesis, human embryonic cells: 2529
  - urine, bladder cancer and smokers, effect of ascorbic acid: 2549

- LACTATION
  - effect on hormonally active induced ovary tumors, rabbit: 2577
- LARYNX NEOPLASMS
  - cell growth kinetics: 2698
  - juvenile papillomatosis of larynx: 2709
- LASIOCARPINE
  - induction of helical polysomes, rat liver: 2563
- LEUKEMIA, EXPERIMENTAL (See also under Virus, leukemia/lymphoma)
  - cell lines, stimulation of normal or tumor cells, mouse: 2582
  - genetic susceptibility, herpes-type virus, guinea pig: 2635
  - L2C/NB (guinea pig) effect of ACTH, dimethyl sulfoxide or dexamethasone: 2581
- LEUKEMIA, HUMAN
  - chromosome abnormalities, review: 2513
  - chronic lymphatic, with autoimmune hemolytic anemia and Sjögren's syndrome: 2721
  - epidemiology, aged, review: 2503
  - erythromyeloid, benzene exposure: 2579
  - immunoglobulin synthesis: 2724
- LEUKEMOGENESIS, EXPERIMENTAL (See also under Radiation leukemogenesis)
  - dimethylbenzanthracene, mammary tumor virus-infected mouse: 2612
  - Gross virus, mammary tumor virus-infected mouse: 2612
  - nitrosobutylurea, rat: 2580
  - urethan, radiation effects, mouse: 2518,2519
- LEUKEMOGENESIS, HUMAN
  - chloramphenicol: 2589
- LIVER
  - Δ-aminolevulinic acid synthetase, virus-induced polycythemia, mouse: 2597
  - antigenic component, benzidine-treated rat: 2535
  - catalase, Mazurenko virus-induced leukemia, mouse: 2602
  - enzymes, bioassay of radiation leukemia-protective factor, mouse: 2517
  - helical polysomes, induction, lasiocarpine or aflatoxin, rat: 2563
  - hydroxyfluorenylacetamide metabolism _in vitro_, rat: 2561
  - RNA methylation, effect of diethylnitrosamine, rat: 2562
- LIVER CARCINOGENESIS
  - dimethylaminoazobenzene, pathogenesis, rat: 2564
  - dimethylbenzanthracene + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
  - mathematical model: 2695
  - methyldimethylaminoazobenzene, immunity, intact or splenectomized rat: 2565
  - β-naphthylamine product (benzoquinoline-69), rat and mouse: 2553
  - nitroquinoline oxide + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
  - prenatal or neonatal, children, review: 2502
  - pyrrolizidine alkaloids, review: 2498
- LIVER NEOPLASMS
  - children, review: 2502
  - epidemiology, Uganda (West Nile District), aflatoxin-contaminated foods: 2677
  - frequency, aged, Italy (Sulmona): 2655
  - transplanted or induced, enzyme patterns, rat: 2711
- LUNG
  - antigenic component, benzidine-treated rat: 2535
  - toxicity, cigarette smoke, rabbit: 2538
- LUNG CARCINOGENESIS
  - human, review: 2493
  - hydroxyurethan or urethan, effect of thymine, mouse: 2547
  - urethan, mouse: 2548
- LUNG NEOPLASMS
  - asbestos bodies, Italy (Perugia): 2543,2544
  - CNS metastases, frequency: 2656
  - epidemiology
    - Brazil (Rio de Janeiro): 2669
    - France (Bordeaux): 2671
    - Rumania (Oradea), smoking: 2668
    - screening of asymptomatic smokers for carcinoma _in situ_: 2546
  - etiology, human, review: 2493
  - frequency, aged, Italy (Sulmona): 2655
    - sex difference: 2670
  - occupational asbestosis, northern Italy: 2541
    - petroleum asphalt exposure, U.S.: 2540
  - premalignant and malignant, smokers, pathology: 2545
  - uranium miners: 2521
    - exposure levels of radon daughter products: 2523,2524,2525
    - U.S., review: 2495
      - smoking, ethnic groups: 2522

MPHOMA, MALIGNANT, EXPERIMENTAL
- L5178Y or P-388 (mouse), virus-free, effect on immunity, mouse: 2592

MPHOMA, MALIGNANT, HUMAN
- chromosome abnormalities, review: 2513
- g.i. tract, frequency, children: 2662
- Hodgkin's disease, sex ratio, worldwide: 2664
  - of stomach, frequency: 2663
- immunoglobulin synthesis: 2724
- Kaposi's sarcoma, father and son: 2720

SERGIC ACID DIETHYLAMIDE (See under Hallucinogens)

LIGNANT TRANSFORMATION
- achalasia of esophagus to cancer, review: 2494
- benign fibroadenoma phylloides to breast carcinoma: 2725
- cervix uteri polyps to cancer of the cervix or endometrium: 2686
- diagnosis, human cancer: 2726
- immunity disorders to myeloma and related diseases: 2706
- juvenile papillomatosis to cancer of larynx: 2709
- keloid-like lesions to fibrosarcoma of skin: 2516
- polyposis to colon cancer, associated brain tumor, adolescent: 2707
  - review: 2512
- traumatized nevus to melanoma, siblings: 2705
- Von Recklinghausen's neurofibromatosis, frequency, children: 2727

MMARY CARCINOGENESIS
- dimethylbenzanthracene, rat: 2570,2571,2572, 2573,2591
- pituitary graft, mouse: 2590
- radiation, monkey: 2515

MMARY GLAND
- premalignant hyperplasia, benzpyrene induction, effect of androgen or light exposure, mouse: 2574

MMARY NEOPLASMS, EXPERIMENTAL (See also under Virus, mammary tumor)
- enzymes, rat: 2711
- postpartum regression, lysosomal enzymes, rat: 2573
- secretion and ultrastructure, rat: 2591
- steroid content, rat: 2572
- tumor-specific antigens, mouse: 2611

MMARY NEOPLASMS, HUMAN
- benign (fibroadenoma phylloides), histogenesis and malignant transformation: 2725
- CNS metastases, frequency: 2656
- epidemiology
  - Hawaii, Japanese: 2687
  - Italy (Trieste): 2653
- sex chromatin: 2716

EDIASTINAL NEOPLASMS
- frequency of malignant tumors, children: 2660

ETABOLISM DISORDERS
- progesterone, cancer of endometrium, review: 2504

-METHYLCHOLANTHRENE
- bladder tumors, mouse or rat: 2551
- cervix, uterus or vagina tumors, hormone effects, mouse: 2575

3-METHYLCHOLANTHRENE (Contd.)
- ovary tumors, hormonal activity pregnancy and lactation, rabbit: 2577
- s.c. sarcoma, host immunity, mouse: 2559
- skin tumors, effect of arsenic, mouse: 2557
- thyroiditis, age and sex difference, rat: 2536
- transformation, effect on sensitivity to non-tumor virus, rat embryo cells: 2616

MITOSIS
- effect of carcinogenic or non-carcinogenic nitroquinolines, *Tetrahymena*: 2530

MOUTH NEOPLASMS
- ameloblastoma of jaw, epidemiology, Africa (Tanzania and Uganda): 2691
- basement membrane ultrastructure: 2710
- epidemiology
  - children, review: 2500
  - smoking, California: 2672
- jaw tumors, epidemiology, Korea: 2692

MUTAGENESIS
- carcinogenic tryptophan metabolites, human embryo cells: 2529
- LSD, fungi: 2531
- nitroquinoline oxide, yeast: 2584
- somatic, host immunity and aging, review: 2510

MYELOMA AND RELATED DISEASES
- immunoglobulin abnormalities: 2723
- pathogenesis: 2706

β-NAPHTHYLAMINE
- bladder tumors, dog: 2552
- product (benzoquinoline-69), liver and s.c. tumors, rat and mouse: 2553
- s.c. tumors, mouse or rat: 2552

NEOPLASMS, EXPERIMENTAL
- Ehrlich ascites carcinoma (mouse), cell growth kinetics: 2696,2699
- R-1 rhabdomyosarcoma (rat), radiation-induced, radiation effect on growth kinetics: 2700

NEOPLASMS, HUMAN
- all tumors
  - epidemiology, Italy (Trieste): 2653
    - San Marino: 2654
    - Yugoslavia (Split): 2652
- chromosome abnormalities: 2719
  - review: 2513
- diagnostic method: 2726
- embryonal tumors, pathogenesis, review: 2511
- growth kinetics, measurement: 2701,2702
- HEp-2 cell line, latent genetic damage, radiation and temperature effect: 2714
- host immunity and aging, review: 2510
- tumor-specific antigens: 2722

NERVOUS SYSTEM NEOPLASMS (See also under Brain neoplasms)
- spinal cord, frequency, children: 2658
- spontaneous, domestic animals, cases and review: 2694

4-NITROQUINOLINE 1-OXIDE
- derivatives, mechanism of action, *Tetrahymena*: 2530
- g.i. and liver tumors, rat: 2567
- mutagenesis, yeast: 2584
- stomach tumors, effect of salivary gland removal, rat: 2568

NITROSAMINES
- spontaneous formation (from nitrites and secondary amines) in stomach, rat: 2569

NITROSAMINE, DIETHYL-
- effect on RNA methylation, rat liver: 2562
- g.i. and liver tumors, rat: 2567

NITROSAMINE, DIMETHYL-
- kidney tumors, ultrastructure, rat: 2554

N-NITROSOBUTYLUREA
- leukemia and g.i. tumors, rat: 2580

NUCLEIC ACIDS, DNA
- adenovirus-infected cells: 2614,2638,2640
- effect of cycloheximide, SV40-containing monkey cells: 2647
- herpes-type virus-infected cells, radiation effects, interaction with normal human WBC: 2622
- histone synthesis, polyoma-infected mouse embryo cells: 2649
- Rauscher virus-infected cells: 2630
- replication, polyoma virus: 2650

NUCLEIC ACIDS, RNA
- adenovirus-infected cells: 2638
- amino acid-acceptor fraction, avian myeloblastosis (BAI strain A) virus: 2605
- helical polysomes, induction, lasiocarpine or aflatoxin, rat liver: 2563
- localization, bladder or prostate cancer and corresponding normal cells, human: 2697
- methylation, effect of diethylnitrosamine, rat liver: 2562
- Rauscher virus, homology with host cell DNA: 2630
- transfer RNA methylase, properties, adenovirus 12-induced hamster tumor: 2613

NUCLEUS
- unequal division, nitroquinoline carcinogens, *Tetrahymena*: 2530

OCCUPATIONAL DISEASES
- asbestos exposure, lung or pleural tumors, northern Italy: 2541
- benzene exposure, erythroleukemia: 2579
- lung cancer
  - uranium miners: 2521
    - radon daughter exposure levels: 2523, 2524,2525
    - smoking, ethnic groups, U.S.: 2522
    - U.S., review: 2495
  - petroleum asphalt workers, U.S.: 2540
- silicosis, with mesothelioma: 2542
- skin cancer, petroleum asphalt workers, U.S.: 2540

OVARY NEOPLASMS
- mesonephroma, sex chromatin: 2717
- methylcholanthrene-induced, hormonal activity, effect of pregnancy and lactation, rabbit: 2577

PANCREAS NEOPLASMS
- epidemiology, USSR (Omsk): 2676

PARASITIC DISEASES
- schistosomiasis, bladder cancer, child: 2666
    - Malagasy Republic (Majunga region): 2708

PHARYNX NEOPLASMS
- epidemiology, smoking, California: 2672

PENIS NEOPLASMS
- epidemiology, Peru (Cuzco), ethnic groups (Indians): 2688

PETROLEUM
- asphalt, occupational exposure, lung and skin cancer, U.S.: 2540

PLANTS
- family *Euphorbiaceae*, isolation and properties of croton oil fractions: 2527

PLASTICS
- s.c. tumors, mechanism, rat: 2560

PLEURA NEOPLASMS
- mesothelioma, occupational asbestosis, northern Italy: 2541
  - silicosis, human and animal: 2542

PODOPHYLLIN DERIVATIVES
- effect on benzpyrene cervicitis, hamster: 2576

PREGNANCY
- effect on hormonally active induced ovary tumors, rabbit: 2577
- placental benzpyrene hydroxylase and aminoazo dye N-demethylase, smoking, rat and human: 2539
- postpartum regression of dimethylbenzanthracene-induced mammary tumors, lysosomal enzymes, rat: 2573

PROSTATE NEOPLASMS
- CNS metastases, frequency: 2656
- epidemiology, Texas (Houston), aged: 2689
- RNA localization, comparison to normal tissue, human: 2697

PYRROLIZIDINE ALKALOIDS
- structure-activity relationships, review: 2498

QUINALDIC ACID DERIVATIVES (tryptophan metabolites)
- bladder tumors, mouse: 2550

QUINOLINE, 4-HYDROXYAMINO-, 1-OXIDE
- skin tumors, effect of dimethylbenzanthracene or dimethyl sulfoxide, mouse: 2558
- stomach tumors, mouse: 2566

RADIATION
- effect on
  - cell growth kinetics, mouse tumor or normal cells: 2699
    - radiation-induced rat sarcoma: 2700
  - Friend spleen focus-forming virus, *in vitro* or *in vivo* (mouse): 2598
  - latent genetic damage, human cancer cells: 2714
- sunlight, defective absorption, skin cancer: 2520
- UV, effect on adenovirus type 1: 2639

RADIATION CARCINOGENESIS
- enhancement of chemical carcinogenesis, review: 2496
- host immunity and aging, review: 2510
- lung, uranium miners: 2495,2521,2522
  - radon daughter exposure levels: 2523, 2524,2525
- mammary gland, monkey: 2515
- skin, fibrosarcoma: 2516

IATION CARCINOGENESIS (Contd.)
  thyroid, human: 2690
IATION LEUKEMOGENESIS
  assay of radiation leukemia-protective factor, mouse: 2517
  effect of urethan, mouse: 2518,2519
IOACTIVE ISOTOPES AND ELEMENTS
  radon and daughters
    calculation of exposure, uranium miners: 2523,2524,2525
    lung cancer, uranium miners: 2521,2522
      review: 2495
SPIRATORY TRACT NEOPLASMS
  epidemiology, San Marino (comparison to Italy): 2654
  particulate air pollution, New York (Buffalo): 2674
TICULOENDOTHELIAL SYSTEM
  function, effect of C57 leukemia virus, mouse: 2631,2632

LIVARY GLAND
  removal, effect on nitroquinoline oxide carcinogenesis, stomach, rat: 2568
AR TISSUE (See also under Injuries)
  achalasia of esophagus, malignant transformation, review: 2494
  keloid-like, malignant transformation (fibrosarcoma): 2516
  lupus vulgaris, spindle cell sarcoma: 2526
  radiation-induced, malignant transformation (fibrosarcoma): 2516
X
  chromosomes, breast cancer: 2716
    mesonephroma or colon tumor, women: 2717
    XO/XY mosaicism, gonadal tumors, review: 2509
  difference, Hodgkin's disease, worldwide: 2664
    lung cancer: 2670
    methylcholanthrene thyroiditis, rat: 2536
ILICON
  pleural mesothelioma, animal and human: 2542
KIN CARCINOGENESIS
  arsenic, human: 2588
  benzpyrene, hexokinase metabolism, mouse: 2555
  cocarcinogenesis, extracts from plants (family Euphorbiaceae), mouse: 2527
  dimethylbenzanthracene, effect of triamcinolone or dimethyl sulfoxide, hamster cheek pouch: 2556
  hydroxyaminoquinoline oxide, effect of dimethylbenzanthracene or dimethyl sulfoxide, mouse: 2558
  methylcholanthrene, effect of arsenic, mouse: 2557
  s.c. sarcoma
    methylcholanthrene, host immunity, mouse: 2559
  β-naphthylamine product (benzoquinoline-69), rat and mouse: 2553
  s.c. tumors
    β-naphthylamine, rat or mouse: 2552
    plastic implants, mechanism, rat: 2560
SKIN NEOPLASMS
  defective absorption of sunlight, human: 2520

SKIN NEOPLASMS (Contd.)
  epidemiology, Italy (Trieste): 2653
  melanoma, frequency of CNS metastases: 2656
    from traumatized nevi, familial (siblings): 2705
  occupational petroleum asphalt exposure, U.S.: 2540
  radiation scar or keloid-like disease, fibrosarcoma, human: 2516
  spindle cell sarcoma, lupus vulgaris scar: 2526
  sweat gland nevi, pathogenesis: 2703
SPLEEN
  Δ-aminolevulinic acid synthetase, virus-induced polycythemia, mouse: 2597
  antigenic component, benzidine-treated rat: 2535
STEROIDS (See under Hormones, steroid)
STOMACH NEOPLASMS
  air pollution, New York (Buffalo), ethnic groups: 2674
  etiology, review: 2501
  frequency, aged, Italy (Sulmona): 2655
  Hodgkin's disease, frequency: 2663
  induction
    dimethylbenzanthracene + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
    hydroxyaminoquinoline oxide, mouse: 2566
    nitroquinoline oxide, effect of salivary gland removal, rat: 2568
      + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
    nitrosobutylurea, rat: 2580
    "spontaneously" formed nitrosamines in stomach, mechanism: 2569
  superficial, epidemiology, Japan: 2673
SV40 (See under Virus, papova)

TEMPERATURE
  cold, effect on latent genetic damage, human cancer, cells: 2714
THYMINE
  effect on urethan or hydroxyurethan lung tumors, mouse: 2547
THYMUS
  leukemia antigen, differentiation, mouse embryo: 2712
THYMUS NEOPLASMS
  epidemiology, children: 2661
THYROID
  methylcholanthrene thyroiditis, age and sex difference, rat: 2536
THYROID NEOPLASMS
  epidemiology, Michigan (Detroit): 2690
TOBACCO
  American cigarettes, arsenic content: 2537
TOBACCO SMOKE
  toxicity, lung, rabbit: 2538
TOBACCO SMOKING
  bladder cancer, children and adolescents: 2666
  bronchogenic carcinoma in situ, screening of asymptomatic population: 2546
  lung cancer
    pathogenesis, human: 2545

TOBACCO SMOKING (Contd.)
    Rumania (Oradea): 2668
    uranium miners, U.S., ethnic groups: 2522
  mouth and pharynx cancer, California: 2672
  placental benzpyrene hydroxylase and aminoazo dye N-demethylase, human: 2539
  urinary tryptophan metabolites, effect of ascorbic acid, human: 2549
TOXICITY
  aflatoxins, swine: 2586
    trout: 2585
  cigarette smoke, lung, rabbit: 2538
TRIAMCINOLONE
  effect on dimethylbenzanthracene tumors, hamster cheek pouch: 2556
TRYPTOPHAN
  metabolites, bladder tumors, mouse: 2550
    mutagenesis, human embryonic cells *in vitro*: 2529
    urinary, effect of ascorbic acid, bladder cancer and smokers: 2549

URETHAN
  leukemogenesis, radiation effect, mouse: 2518, 2519
  lung tumors, effect of thymine, mouse: 2547
    mouse: 2548
URETHAN, N-HYDROXY-
  lung tumors, effect of thymine, mouse: 2547
UTERUS (See Corpus uteri)

VAGINA NEOPLASMS
  induction, methylcholanthrene, hormone effects, mouse: 2575
VIRAL CARCINOGENESIS
  mammary tumor virus interference with viral leukemogenesis, AKR mouse: 2612
  review: 2514
  role of late-replicating X chromosome, female genital cancer: 2718
VIRUS
  arthropod-borne, effect on Shope virus fibroma, rabbit: 2623
  identification method: 2624
  vesicular stomatitis, sensitivity, SV40- or carcinogen-transformed cells: 2616
  wound tumor (plant), assay, method: 2625
VIRUS, ADENO-
  CELO (chick embryo lethal orphan), specific tumor antigen, hamster tumor: 2637
  type 1, UV inactivation: 2639
  type 2
    nucleic acid and enzyme synthesis, cell lines: 2638
    transformed cell lines, attempted induction of infectious virus production: 2615
  type 5, viral and cellular DNA synthesis, hamster or human cells: 2614
  type 7, SV40 hybrid (SP-2), transformation, dog kidney cells: 2641
  type 12
    hamster tumors, transfer RNA methylase properties: 2613
    interaction with host cell DNA, human cancer cells: 2640

VIRUS, ADENO- (Contd.)
    nucleic acid and enzyme synthesis, cell lines: 2638
    transformed cell lines, attempted induction of infectious virus production: 2615
    viral and cellular DNA synthesis, hamster or human cells: 2614
  type 31, nucleic acid and enzyme synthesis, cell lines: 2638
VIRUS, HERPES-TYPE
  Epstein-Barr (human; Burkitt lymphoma)
    cell lines, radiation effect on DNA, interaction with normal human WBC: 2622
    isolation, infectious mononucleosis: 2634
  isolation, leukemia-susceptible guinea pig: 2635
  Lucké (frog kidney tumor), isolation, urine: 2636
VIRUS, HYBRID
  SP-2 (adenovirus 7-SV40), transformation, dog kidney cells: 2641
VIRUS, LEUKEMIA/LYMPHOMA
  AKR (mouse)
    group antigen: 2593
    interference by mammary tumor virus: 2612
  avian leukosis subgroup B, envelope antigenic determinants: 2609
  avian myeloblastosis
    subgroup B, transformation, chick cells: 2606
    virus-cell interactions, chick: 2607
  BAI strain A (avian myeloblastosis)
    amino acid-acceptor RNA, isolation and properties: 2605
    hamster tumor: 2604
    transformation, chick cells: 2606
  Breyere-Moloney (mouse), group antigen: 2593
  Buffet (mouse), group antigen: 2593
  C57 (mouse), RES function during infection: 2631,2632
  C-60 (Manaker) (mouse), group antigen: 2593
  Friend (mouse)
    effect of actinomycin D, mouse: 2629
    group antigen: 2593
    immunosuppression: 2599
    pathogenesis, hybrid (sensitive x resistant) mouse strains: 2596
    polycythemia strain, liver and spleen Δ-aminolevulinic acid synthetase: 2597
    spleen focus-forming strain, radiation effects *in vitro* and in mouse: 2598
  Graffi (mouse)
    cell surface antigens, demonstration, method: 2627
    comparison with other mouse leukemia viruses: 2594
  Gross (mouse)
    group-specific antigen, isolation and properties: 2593,2626
    isolation, method: 2628
    possible occurrence, NZB mouse strain: 2601
    susceptibility, mammary tumor virus-infected AKR mice: 2612
  Herbut (mouse; from human leukemia), group antigen: 2593
  Kaplan (mouse; radiation-induced leukemia), group antigen: 2593

RUS, LEUKEMIA/LYMPHOMA (Contd.)
- LVKL (latent chicken leukosis), from Rous virus-resistant culture, isolation and properties: 2610
- Mazurenko (mouse), liver catalase: 2602
- Moloney (mouse)
  - comparison with Graffi virus: 2594
  - cross-immunity to Harvey sarcoma virus, mouse: 2595
  - related viruses, isolation, method: 2628
- mouse
  - classification of group antigens: 2593
  - isolation, method: 2628
  - plasma cell leukemia, review: 2499
- Rauscher (mouse)
  - group antigen: 2593
  - immunosuppression: 2600
  - properties of tissue culture line: 2603
  - RNA, homology with host cell DNA: 2630
- Rich (mouse), group antigen: 2593

RUS, MAMMARY TUMOR
- mouse
  - interference with viral leukemogenesis, AKR mouse: 2612
  - tumor-specific antigens: 2611

RUS, PAPOVA (papilloma-polyoma-vacuolating)
- human wart
  - structure: 2651
- polyoma
  - activation of synthesis, transformed cells: 2619
  - cellular DNA and histone synthesis, mouse embryo cells: 2649
  - DNA replication: 2650
  - structure: 2651
  - transformation, rat and hamster cells: 2618
  - transformed cells, attempted induction of infectious virus production: 2615
    - glycosidase activity: 2617
  - tumors
    - immunity, rabbit: 2620
    - stimulation by Freund's adjuvant, mouse: 2621
- SV40
  - adenovirus 7 hybrid (SP-2), transformation, dog kidney cells: 2641

VIRUS, PAPOVA (papilloma-polyoma-vacuolating)(Contd.)
  - cycloheximide effect on DNA, monkey cells: 2647
  - effect on sensitivity to non-tumor virus, rat embryo cells: 2616
  - interference, mechanism: 2643
  - multiplication, species difference, mammalian cells: 2642
    - virus genome, transformed hamster cells: 2644
  - reactivation of genome, comparison to polyoma or adenovirus, transformed cells: 2615
  - transformation, dog kidney cells: 2641
  - transformed cells
    - glycosidase activity: 2617
    - human (W18VA2), chromosomes: 2646
    - monkey or human, absence of repressor: 2645
    - mouse-human hybrid, T antigen: 2648

VIRUS, POX
- Shope fibroma, effect of arboviruses, rabbit: 2623

VIRUS, SARCOMA
- Harvey (mouse)
  - cross-immunity to Moloney leukemia virus, mouse: 2595
  - specific tumor antigen, mouse tumors: 2595
- Rous (chicken)
  - envelope antigenic determinants: 2609
  - host immunity, pigeon: 2608
  - resistant culture, isolation of latent chicken leukosis virus (LVKL): 2610
  - tumors, induction and resistance, Japanese quail: 2633
    - stimulation by Freund's adjuvant, rat: 2621

VITAMINS
- ascorbic acid, effect on urinary tryptophan metabolites, bladder cancer and smokers: 2549

XANTHURENIC ACID DERIVATIVES (tryptophan metabolites)
- bladder tumors, mouse: 2550

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF H.E.W.

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

99405

DECEMBER 1969
Abstract Nos. 2728-2981

Vol. 7
No. 12

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

CARCINOGENESIS ABSTRACTS

Volume 7, Number 12
December, 1969

Abstract Numbers
2728-2981

CONTENTS

	Page
Review	509
Physical Carcinogenesis	513
Chemical Carcinogenesis	516
Viral Carcinogenesis	526
Epidemiology and Biometry	537
Miscellaneous	546
Author Index	i
Subject Index	iv

THE LIBRARY OF THE
FEB [illegible] 1970
UNIVERSITY OF ILLINOIS

DD

THE LIBRARY OF THE
APR 28 1970
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Prepared by Medical Literature, Inc.
Philadelphia, Pennsylvania 19103

S. Sim Kessler, Director

Editorial Advisor: Leila Diamond, Ph.D.
Wistar Institute, Philadelphia

For the Etiology Area,
National Cancer Institute
Bethesda, Maryland

Persuant to a Contract with the Public Health Service
U.S. Department of Health, Education and Welfare
PH43-68-1261

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget on July 25, 1967.

FOREWORD

The National Cancer Institute, in response to Congressional interest and desire for a national program of cooperative research in cancer, is establishing a means whereby information in the field of carcinogenesis will be coordinated and made available. The information to be included will be obtained from the National Cancer Institute, other governmental agencies, and non-governmental research institutions.

The issuing of *Carcinogenesis Abstracts* under the auspices of the National Cancer Institute will provide a central source for current abstracting of the carcinogenesis literature being published throughout the world. This will help facilitate an integrated and cooperative program of investigation in this area. The growing number of publications in the area of carcinogenesis makes imperative the availability of an appropriate abstracting service so that investigators may be apprised of progress with a minimum of delay. It is our desire to provide the investigator with a readily systematized compilation of the published work.

Carcinogenesis Abstracts will be published monthly and will include abstracts from the most recently published literature.

Inquiries may be addressed as follows:

Carcinogenesis Abstracts
National Institutes of Health
National Cancer Institute
Bethesda, Maryland 20014

NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. If the journal is not covered by *Index Medicus*, then the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

ABBREVIATIONS USED IN ABSTRACTS

admin.	administered, administration	mg	milligram(s)
av.	average	min.	minute(s)
C	curie(s)	ml	milliliter(s)
mC	millicurie(s)	mm	millimeter(s)
µC	microcurie(s)	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
conc.	concentration	NIH	National Institutes of Health, USA
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	QO_2	oxygen quotient
DNase	deoxyribonuclease	PFU	plaque forming unit
e.g.	for example	ppm	parts per million
FFU	focus forming unit	pt.(s)	patient(s)
g.i.	gastrointestinal	RBC	red blood cells (erythrocytes)
g	gram(s)	RES	reticuloendothelial system
µg	microgram(s)	resp.	respectively
Hb	hemoglobin	RNA	ribonucleic acid
i.a.	intra-arterial	RNase	ribonuclease
ID_{50}	median infectious dose	soln.	solution
inj.	injected, injection(s)	s.c.	subcutaneous
inoc.	inoculated, inoculation(s)	TCID	tissue culture infectious dose
i.p.	intraperitoneal	x	times (e.g. x 3/wk.)
I.U.	international unit(s)	U	unit
i.v.	intravenous	UV	ultraviolet
kg	kilogram(s)	vol.	volume
LD_{50}	median lethal dose	VA	Veterans Administration
M	molar, mole(s)	wt.	weight
mM	millimole(s)	WBC	white blood cells (leukocytes) or white blood cell count
µM	micromole(s)		
max.	maximum	yr.	year(s)

LANGUAGE ABBREVIATIONS

Af.	Afrikaans	E.	English	Hun.	Hungarian	Lith.	Lithuanian	Ser.	Serbo-Croatian
Ar.	Arabic	Eston.	Estonian	Ic.	Icelandic	Maced.	Macedonian	Sl.	Slovene
Bul.	Bulgarian	Fin.	Finnish	In.	Indonesian	Nor.	Norwegian	Sp.	Spanish
Ch.	Chinese	Fr.	French	It.	Italian	Pol.	Polish	Sw.	Swedish
Cz.	Czech	Ger.	German	Jap.	Japanese	Por.	Portuguese	Th.	Thai
Dan.	Danish	Gr.	Greek	Kor.	Korean	Rum.	Rumanian	Uk.	Ukrainian
Dut.	Dutch	Heb.	Hebrew	Latv.	Latvian	Rus.	Russian	Viet.	Vietnamese

2728 THE OSTEOMAS. (Fr.) Lance, P.
Rev. Prat. (Paris) 19(14):2143-2151,
59. (No references)

e etiology, pathogenesis and clinical course
the primary, traumatic, neurogenic and
teoid osteomas are discussed.

-2729 PROBLEM OF THE PREMALIGNANT SKIN
DISEASES. (Ger.) Undeutsch, W.
. Clin., Tubingen, Germany). Therapiewoche
(22):1043-1046, 1969. (23 references)

e differential diagnosis of premalignant skin
sions, including radiation-induced hyper-
ratosis, senile (actinic) keratosis, and pre-
lignant or malignant lesions developing on
ar tissue, is discussed.

-2730 STUDIES OF THE EFFECTS OF Mg^{++} IN THE
PATHOGENESIS, THERAPY AND PREVENTION
DISORDERS OF THE LYMPHORETICULAR SYSTEM.
p.) Aleksandrowicz, J. (U. Cracow, Poland).
lia Clin. Int. (Barc.) 19(4):223-224, 1969.
references)

is concluded that a statistically significant
ficit of calcium and magnesium ions can be
monstrated in both the peripheral blood and
e urine of pts. with chronic lymphatic
ukemia, but not in pts. with acute leukemia or
anulocytic leukemia; this deficit is primarily
e result of a dietary deficiency resulting
om impoverishment of the soil. Analysis of
e soil of 2 agricultural areas in Poland in
ich bovine and human leukemia have been
demic for some yr. showed a mean soil pH of
prox. 5.0 and a magnesium content of 2.0
/100 g soil, compared to pH 6.0-7.0 and 10-20
/100 g soil, resp. in a control agricultural
gion.

-2731 INORGANIC CARCINOGENIC SUBSTANCES IN
THE NORMAL ENVIRONMENT AND IN INDUSTRY.
um.) Zamfir, Gh. (Hyg. Inst., Iasi, Rumania).
v. Mediochir. Iasi 72(2):277-284, 1968.
o references)

e high frequencies of certain malignant
mors in mine, mill and smelter workers exposed
arsenic, asbestos, iron and steel, chromates,
ckel and beryllium are discussed, with
rticular reference to skin cancer after
senic exposure and bronchopulmonary cancer in
rsons exposed to the other minerals. Carcino-
nic effects of these and other substances
ncluding certain plastics) in animals are also
iscussed.

)-2732 OCCUPATIONAL CANCER OF THE SKIN. (E.)
Gellin, G. A. (1014 Broadway, Cincinnati, Ohio) and P. A. Possick. Cutis 5(5):543-548, 1969. (44 references)

The majority of occupational skin cancers are caused by tar, pitch, shale and mineral oils and their distillation products (the major carcinogenic components are 3,4-benzpyrene, 1:2,5:6-dibenzanthracene and 7,12-dimethylbenzanthracene); the minority of these tumors are caused by inorganic substances (such as arsenic), burns, trauma, ionizing radiations and sun exposure. In Great Britain, where occupational dermatoses are among the compensated occupational diseases reported to the Ministry of Social Security, occupational skin cancers comprise less than 1% of all skin cancers.

69-2733 ETIOLOGY AND PATHOGENESIS OF BLADDER CANCER. (Ger.) Wolf, H. (VA Hosp., Madison, Wis.), L. V. Wagenknecht and P. O. Madsen. Urologe 8(2):81-96, 1969. (175 references)

In a discussion of bladder cancer epidemiology in man, the roles of certain chemicals often appearing as byproducts of some industries (especially β-naphthylamine), smoking and schistosomiasis are discussed. Methods for inducing bladder cancer in animals, and metabolic pathways of aromatic amines (especially tryptophan), are presented. A brief discussion of the possible causes of localized outbreaks of bladder cancer in cattle is also included.

69-2734 THE SPECTRE OF TODAY'S ENVIRONMENTAL POLLUTION---USA BRAND: NEW PERSPECTIVES FROM AN OLD SCOUT. (E.) Stokinger, H. E. (Bureau Occup. Safety Health, Cincinnati, Ohio). Amer. Indust. Hyg. Ass. J. 30(3):195-217, 1969. (128 references)

In the continental U.S., the most hazardous air, water and food pollutants (excluding radiation) are carcinogens, cadmium, selenium, asbestos, nitrates, hard water, asthmagens and respiratory irritants, which have been implicated in 12 of the most prevalent diseases in the U.S. (including respiratory and g.i. cancer). Most of these substances seem to act by acceleration of aging. Airborne pollutants are more hazardous than water- and food-borne pollutants combined. The effects of these substances seem to be expressed only through interaction with other environmental substances (it is pointed out that some of these substances can counteract the effects of the hazardous pollutants), and/or some preconditioning factor(s) present within the host. Considering the levels of these pollutants existing presently or projected for the foreseeable future, it is suggested that homeostatic mechanisms sufficient to counteract the effects of these pollutants exist in the majority of the population of the continental U.S.

69-2735 VIRAL AND CHEMICAL LEUKEMOGENESIS AND HOST CONDITIONING. (E.) Nishizuka, Y. (Aichi Cancer Ctr. Res. Inst., Nagoya, Japan). Acta Path. Jap. 18(3):357-361, 1968. (21 references)

Results of previously published reports (mostly by the author and colleagues) are presented. Studies discussed in some detail include: the role of the H-2^{K} histocompatibility locus in susceptibility to Gross leukemia virus (GLV) in AKR mice and their hybrids; interference of accidentally transmitted mammary tumor virus with GLV leukemogenesis in AKR mice; the failure to demonstrate a leukemia virus in 7,12-dimethylbenzanthracene (DMBA)-induced mouse leukemia; the possible host-conditioning effects of DMBA in mice of different strains; and the pathological and cytogenetic differences between DMBA-induced rat and mouse leukemias.

69-2736 CARCINOGENESIS AND SANITY. (E.) Roe, F. J. C. (Roy. Cancer Hosp., London). Food Cosmet. Toxic. 6(4):485-498, 1968. (93 references)

Animal testing of foods, food constituents, contaminants and additives for substances with carcinogenic or cocarcinogenic activity is discussed. A study of the formation of nitrosamines and other carcinogens during processing or cooking (as a result of interaction between ingredients or of pyrolysis) is recommended, as is a standard upper limit for the 3,4-benzpyrene level in foods.

69-2737 PROBLEM OF THE TWO-PHASE MECHANISM OF CARCINOGENESIS. (Ger.) Meyer-Bertenrath, J. G. (Gen. Hosp., Marburg, Germany). Klin. Wschr. 47(4):173-179, 1969. (44 references)

The mechanisms of cocarcinogenesis and "syncarcinogenesis" at the molecular level are discussed. The carcinogen apparently induces cellular mutations during the initiating stage (especially by acting on chromosomal DNA), whereas tumor promotion takes place in several steps. The tumor-promoting effects of the phorbol esters (croton oil constituents) apparently results from a simultaneous combination of irritation, toxicity and effects on the cell surface.

69-2738 GAS CHROMATOGRAPHIC DETERMINATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS. (It.) Savino, A. (U. Perugia, Italy). Riv. Ital. Ig. 28(1-2):56-65, 1968. (20 references)

A review of methods of gas chromatographic determination of polycyclic aromatic hydrocarbons, with particular reference to tobacco smoke, is supplemented by results of gas chromatographic analysis of 26 such hydrocarbons, showing the absolute retention times and retention temperatures of the individual compounds. The same data are also reported (together with the relative retention times as compared to 1-methylphenanthrene) for a mixture of all 26 hydrocarbons. Also reported are the relative retention areas (compared to the same internal standard) of 10 of the individual compounds and 5 groups of related compounds, using the same mixture of all 26 hydrocarbons.

69-2739 THE CARCINOGENIC ACTION AND METABOLISM OF URETHAN AND N-HYDROXYURETHAN. (E.) Mirvish, S. S. (Weizmann Inst. Sci., Rehovoth, Israel). Advances Cancer Res. 11:1-42, 1968. (251 references)

The organs most susceptible to urethan (U) carcinogenesis in mice may also be those organs with the greatest susceptibility (perhaps genetically determined) to spontaneous tumor development. Promotion or inhibition of U-induced lung carcinogenesis or leukemogenesis by X-rays apparently depends on the radiation dosage (large doses destroy or damage U-initiated cells, while small X-ray doses themselves act as initiators). The active carcinogenic metabolite of U may act by ethylation or carbethoxylation of cellular macromolecules. The high structural specificity (especially for the ethyl group) required for the carcinogenic effects of U is similar to the specificity required for its antileukemic effects, whereas the structural specificity required for its anesthetic action is much lower. The active metabolite of U is probably not N-hydroxyurethan (NHU), which is in fact converted to U before acting as a carcinogen. The cytotoxicity of NHU (a more powerful cytotoxic agent than U) apparently depends on inhibition of DNA synthesis.

69-2740 RUNTING SYNDROMES, AUTOIMMUNITY, AND NEOPLASIA. (E.) Keast, D. (U. Western Australia, Perth). Advances Cancer Res. 11:43-71, 1968. (221 references)

If the chronic stage of the homologous runting syndrome is to be considered as an experimental model for the study of autoimmunity as a possible precursor of malignant tumors, the prsently unknown nature of the "autoimmune" reaction seen during this phase (either true autoimmunity, or "pseudoautoimmunity" caused by the persistence of donor cells) must be determined. The possibility that phagocytized, biologically active nucleic acids, as well as viral DNA or RNA, can induce autoimmune reactions progressing to neoplasms is discussed; it is pointed out that reovirus Type 3 can have such an effect. Studies of the possible induction of similar processes by the DNA virus of Aleutian mink disease, or the RNA-containing mouse leukemia viruses, are recommended.

2741 VIRAL-INDUCED ENZYMES AND THE PROBLEM
OF VIRAL ONCOGENESIS. (E.) Kit, S.
ylor U. Coll. Med., Houston, Tex.). Advances
cer Res. 11:73-221, 1968. (553 references)

uction of enzymes (especially enzymes involved
DNA and RNA metabolism) by viruses is dis-
sed. Most of the studies on virus-induced
ymes involved in DNA and RNA metabolism deal
h bacteriophages. The section on the bio-
mical aspects of viral carcinogenesis deals
marily with the papovaviruses and Rous sarcoma
us.

2742 MOLECULAR GEOMETRY AND CARCINOGENIC
ACTIVITY OF AROMATIC COMPOUNDS. NEW
SPECTIVES. (E.) Arcos, J. C. (U.S. Pub.
lth Serv. Hosp., New Orleans, La.) and M. F.
us. Advances Cancer Res. 11:305-471, 1968.
6 references)

ucture-carcinogenic activity relationships
compounds of the condensed polycyclic
matic hydrocarbon series and for conjugated
lamines (including arylhydroxylamines,
lnitro compounds and aminoazo dyes) are
cussed. A section on covalent binding of
ycyclic hydrocarbons, tricycloquinazoline,
itroquinoline-N-oxide, arylamines and aminoazo
s to proteins and nucleic acids is included.
606 references extend from the most recent
iew article (published in 1962) through
ober, 1967; an addendum summarizes more
cent literature (62 references) up to
tember, 1968.

-2743 (SLOW) VIRUS INFECTION, AUTOIMMUNITY,
AND LYMPHOMA: AN EXPERIMENTAL MODEL
HUMAN DISEASE. (E.) Mellors, R. C. (Cornell
Med. Coll., New York, N. Y.). Trans. Coll.
ysicians Phila. 36(3):123-131, 1969.
references)

is suggested that the characteristic syndrome
NZB mice (autoimmune hemolytic anemia,
omerulonephritis, sometimes terminal pleo-
rphic lymphoma) results from the combined
fects of an appropriate genotype and a somatic
tation. Mouse leukemia virus-like particles
ve been demonstrated in thin sections of
ssues from NZB mice of all ages from embryo
adult. The role of the virus in the auto-
mune syndrome was suggested by the development
autoimmune manifestations (together with
mphoma in 10% of the group) in newborn and
by Swiss mice inoc. with cell-free spleen or
mphoma preparations from NZB mice. This
stem is proposed as an experimental model for
e study of the relationship between auto-
munity and lymphoreticular neoplasms in man.

-2744 ABO BLOOD GROUPS, SECRETOR STATUS AND
DISEASE. (E.) Denborough, M. A.
(Roy. Melbourne Hosp., Australia) and H. J. Downing. Aust. Ann. Med. 18(1):74-80, 1969. (89 references)

Several hypotheses attempting to account for the association between stomach cancer and blood type A (and between blood type O and ABH non-secretion and duodenal ulcer) are discussed.

69-2745 PRIMARY MELANOMAS IN UNUSUAL SITES. (E.) Dasgupta, T. K. (Mem. Hosp. Cancer Allied Dis., New York, N. Y.) R. D. Brasfield and M. A. Paglia. Surg. Gynec. Obstet. 128(4):841-848, 1969. (71 references)

The frequencies, pathogenesis and differential diagnosis of the rare primary melanomas of the oral and respiratory mucosa, larynx, esophagus and bronchial tree, rectum and gallbladder, female genital organs (ovary, cervix and vagina), adrenal cortex, urethra and meninges are discussed.

69-2746 TUMORAL ASPECTS OF OSSEOUS DYSTROPHIES. (Fr.) Trifaud, A. and H. Roux. Rev. Prat. (Paris) 19(14):2107-2118, 1969. (18 references)

A discussion of some diseases sometimes presenting bony pseudotumors: Von Recklinghausen's neurofibromatosis (the "brown tumor" is rarely associated with a malignant parathyroid tumor), fibrous dysplasia of bone (about 2.5% of all bone tumors and 7% of all benign tumors, with sarcomatous degeneration in about 1% of cases), and Paget's disease of bone.

69-2747 ON THE FAILURE OF SELF-INHIBITION OF GROWTH IN TUMORS. (E.) Burns, E. R. (U. Arkansas Med. Ctr., Little Rock). Growth 33(1):25-45, 1969. (187 references)

Evidence indicating the possibility that some tumors may regulate their own growth (in the same way as normal and non-neoplastic tissues), by producing a homologous mitotic inhibitor which is specific for cell growth of the same type only, is presented. The Ehrlich ascites carcinoma system in mice is proposed as a model to study this phenomenon.

69-2748 AUTOSOMAL ANOMALIES IN MAN. (E.) Nusbacher, J. (Mt. Sinai Sch. Med., New York, N.Y.) and K. Hirschhorn. Advanc. Teratology 3:11-63, 1968. (242 references)

In addition to a discussion of the autosomal abnormalities associated with malignant diseases (all but 1 of which are non-specific), and the familial autosomal abnormalities associated with high frequencies of leukemia and related diseases in affected persons and their relatives (possibly resulting from genetic susceptibility to malignant transformation by chemicals, viruses and/or radiation), 1 rare instance of familial chronic myeloid leukemia (CML) and apparently familial transmission of the Philadelphia (Ph^{1}) chromosome is presented. The proband died of Ph^{1}-positive CML. His daughter (29 yr. old) and her 3 sons (4-7 yr. old) were clinically normal, but the daughter and her 2 older sons showed the Ph^{1} chromosome. The proband's other relatives were not examined for chromosomal abnormalities, but his son developed anemia with leukocytosis in his early 40's, his father, sister and brother had died of chronic leukemia (CML in the 2 siblings, unknown type in the father), and his sister's son had died of thymoma.

69-2749 TUMOR VIRUS AND VIRUS TUMORS. (Ger.) Tauchnitz, C. (Karl Marx U., Leipzig, Germany) and H.-P. Keller. Z. Ges. Inn. Med. 24(3):65-70, 1969. (120 references)

Mechanisms of tumor induction by DNA- and RNA-containing viruses are discussed, with particular reference to the search for viruses in human malignant tumors (especially Burkitt's lymphoma).

69-2750 VIRUSES IN CARCINOGENESIS. (E.) Dulbecco, R. (Salk Inst. Biol. Studies, San Diego, Calif.). Ann. Intern. Med. 70(5):1019-1030, 1969. (29 references)

Mechanisms of cell transformation by DNA- and (in a small number of studies) RNA-containing tumor viruses are discussed. The difficulties inherent in the search for human cancer viruses are presented.

69-2751 VIRUS AND TUMOR. (Ger.) Löffler, H. (U. Basel, Switzerland). Praxis 58(23):729-730, 1969. (No references)

69-2752 A SHORT ACCOUNT OF ONCOGENIC VIRUSES. (E.) Issa, H. J. Egypt. Pub. Health Ass. 44(2):155-161, 1969. (No references)

69-2753 BURKITT'S TUMOR. (E.) Carbone, P. P. (NCI, Bethesda, Md.), C. W. Berard, J. M. Bennett, J. L. Ziegler, M. H. Cohen and P. Gerber. Ann. Intern. Med. 70(4):817-832, 1969. (26 references)

69-2754 IMPORTANCE OF THE NON-DIVIDING LEUKEMIC CELL. (E.) Mauer, A. M. (U. Cincinnati, Ohio), E. F. Saunders and B. C. Lampkin. Recent Results Cancer Res. 17:168-174, 1969. (27 references)

69-2755 SIGNIFICANCE OF AFLATOXIN. (Ger.) Bösenberg, H. (U. Münster/Westf., Germany). Naturwissenschaften 56(7):350-352, 1969. (80 references)

69-2756 CELLULAR MEMBRANE ALTERATIONS IN NEOPLASIA: A REVIEW AND A UNIFYING HYPOTHESIS. (E.) Hoelzl Wallach, D. F. (Mass. Gen. Hosp., Boston, Mass.). Curr. Top. Microbiol. Immun. 47:152-167, 1969. (205 references)

See also abstract no.: 2938

-2757 HARMFUL EFFECTS OF THERAPEUTIC IRRADIATION WITH ^{198}AU AND ^{131}I ON THE
DICAL STAFF. (Hun.) Füzy, M. (Nat. Inst.
col., Budapest) and Z. Karika. Magy. Onkol.
(4):193-197, 1968.

vels of radiation exposure of medical personnel
ring systemic admin. of radioisotopes to
ncer pts. were determined, using ionization
ambers attached to the hands, chest and fore-
ad. Each admin. procedure lasted 3-5 min. and
e usual safety measures were followed. During
min. of ^{198}Au (14-100 mC), radiation exposure
vels were 25-68 mr for intracavitary inj. and
-167 mr during i.v. inj. During p.o. admin.
^{131}I (30-120 mC), the radiation exposure
vel was 30-280 mr.

-2758 SENSITIVITY OF MAMMALIAN CELLS TO ULTRAVIOLET IRRADIATION IN VITRO.
er.) Buder, E. (Biophys. Inst., Berlin),
Schramm, R. Wetzel and A. Graffi. Arch.
schwulstforsch. 33(4):319-330, 1969.

ltures of HeLa and FL (human amnion) cells, 2
nes of spontaneously transformed male human
bryonic cells (PMF fibroblasts and PMN kidney
lls), and primary cultures of calf (kidney),
t (whole embryo) or mouse (whole embryo) origin,
re exposed to various doses of UV light
avelength 254 nm). Threshold UV doses, caus-
g transient morphological changes, varied from
culture to another. The normal cells were not
re sensitive to UV than the malignant cells;
fact, the mouse fibroblast and calf kidney
ltures showed the same threshold doses as the
N cells, which were higher than the threshold
ses for the HeLa, PMF and FL cells. Some of
e irradiated normal cell cultures underwent
oplastic transformation; however, since some
the non-irradiated control cultures (main-
ained in vitro for up to 8 wk.) also induced
umors in newborn animals, no evidence for UV-
nduced neoplastic transformation was found.

9-2759 INFLUENCE OF CHEMICAL RADIATION PROTECTORS ON LATE RADIATION LESIONS
ND RADIATION CARCINOGENESIS. (Fr.) Duplan,
. F. (Radium Inst., Paris) and P. Maldague.
ev. Med. Liege 23(Suppl.):139-144, 1968.

n rats admin. X-irradiation to 1 kidney, the
ose-reduction factor (DRF) for mercapto-
thylamine (admin. just before irradiation),
ith respect to the induction of benign or
alignant kidney tumors, was close to the DRF
alue for the 30-day mortality rate (1.5-1.6 and
bout 1.8, resp.). Since radiation-induced cell
eath results in a stimulation of cellular
egeneration (which seems to be necessary for
umor induction), it is suggested that the
adioprotective agent, by reducing the lethal
effects of radiation on the cells, inhibited radiation carcinogenesis by reducing the regeneration stimulus to below-threshold levels. In Strain XVII mice admin. X-irradiation, however, the DRF value for cysteine (admin. just before irradiation) with respect to leukemogenesis was very low (about 1.3), whereas the DRF for the 30-day mortality rate (1.6) was close to the DRF with respect to protection of hematopoietic cells in vitro against radiation. The intervention of another factor (perhaps a virus), on which the radio-protective agent had little or no effect, is suggested to account for these results.

69-2760 POSTIRRADIATION MALIGNANT NEOPLASMS OF THE UTERINE FUNDUS. (E.) Thomas, W. O., Jr. (U. Oregon Medical School, Portland), H. H. Harris and J. A. Enden. Amer. J. Obstet. Gynec. 104(2):209-219, 1969.

From 1940-1968, 854 adenocarcinomas of the endometrium and 165 sarcomas were seen at the Emanuel Hospital (Portland, Oregon); in 1950-1968, 1248 pts. with carcinoma of the cervix and 8 with benign conditions were treated by radium therapy. From 1940-1968, 14 pts. from this hospital and 2 from the University of Oregon Medical School Hospital developed postirradiation tumors of the uterine fundus (11 adenocarcinomas, including 3 adenocarcinomas in situ, of the endometrium; 3 carcinosarcomas; 2 mixed mesodermal tumors). Five of these pts. had been treated for benign conditions and 11 for squamous cell carcinoma of the cervix. The age range was 39-69 yr. (av. 54.7 yr.); all pts. were postmenopausal after radiotherapy. The uterine fundus tumors were found 2-25 yr. after radiotherapy (av. 11.8 yr.). In the 12 pts. who had ever been pregnant, the av. number of pregnancies was only 1.8; only 1 pt. was a grand multipara (8 children) and 3/16 had histories of habitual abortion. Obesity was noted in 56% and hypertension in 56%. One pt. became diabetic 10 yr. after hysterectomy for the uterine fundus tumor. Histories of estrogen therapy were noted for 7/16 pts.; 5/7 had received estrogens for 10 yr. or more.

69-2761 MAMMARY GLAND NEOPLASMS AFTER FISSION NEUTRON IRRADIATION. (E.) Vogel, H. H., Jr. (U. Tennessee, Memphis). Nature (London) 222(5200):1279-1281, 1969.

Specific pathogen-free female Sprague-Dawley/ANL rats (2-4 mo. old) were exposed to single doses of whole-body fission neutron irradiation (5-400 rads) in a γ-neutron radiation chamber (Argonne National Laboratory reactor CP-5). The γ-ray contamination was 10-15%. In contrast to the effects of X-rays or γ-irradiation, the 18-mo. cumulative incidence of mammary tumors (benign and malignant) in these rats did not increase linearly with the radiation dosage between 10 rads (85.3%) and 250 rads (76.4%). In non-irradiated controls and rats admin. 5 rads, the cumulative mammary tumor incidence rates were 48.3% and 51.8%, resp. The latent period showed a smooth curve from about 600 days in controls to about 215 days in rats admin. 50 rads, but the latent periods remained in the neighborhood of 215 days at the higher doses (up to 400 rads). It is concluded that exposure to fission neutron irradiation accelerates a natural biological process, but the difference between the saturation dosage of neutron irradiation (10 rads) and of X-rays or γ-irradiation (400 r) could not be explained. The relative biological effectiveness (RBE; neutron/γ) factor for mammary tumor induction was much higher than the usual factor of 2-4 for acute lethal toxicity in rodents, or even the quality factor of 10 recommended for neutron protection.

69-2762 SKELETAL CHANGES FOLLOWING IRRADIATION OF CHILDHOOD TUMORS. (E.) Katzman, H. (1771-D West Romneya Drive, Anaheim, Calif.), T. Waugh and W. Berdon. J. Bone Joint Surg. [Amer.] 51-A(5):825-842, 1004, 1969.

From 1940-1959, 97 infants and children with Wilms' tumor (51) or neuroblastoma (46) were treated by surgery and radiotherapy (RT; usually orthovoltage radiation) at 1 hospital. Follow-up data were available for 15/19 survivors treated for Wilms' tumor and for the 13 surviving pts. treated for neuroblastoma; av. follow-up periods in these 2 groups were 12.7 and 12.1 yr., resp. (range, over 3.5-nearly 25 yr.). RT was admin. in tumor doses of 1400-4284 r (av. 2850 r) over 15-180 days (av. 28 days). The most frequent bony changes seen were vertebral body changes, scoliosis, and hypoplasia of the ilium and rib cage. Five pts. (18%) developed benign osteocartilaginous exostoses involving irradiated bones; in 2/5, the tumors were histologically identified as benign osteochondromas. One other pt. showed a radiolucent lesion of the scapula, which was not identified by biopsy. In addition to these 28 pts., 3 infants (7 wk.-3 mo. old) admin. RT for other conditions were also followed up. One of these (male) was treated by surgery and RT (14,800 r in 2 fields, air dose) for bilateral retinoblastoma. This pt. developed an osteogenic sarcoma in part of the irradiated region (the nasal antrum) 12 yr. after RT was completed; the data indicated that this tumor was a radiation-induced sarcoma.

69-2763 LONG-TERM FOLLOW-UP STUDIES OF THE COURSE OF JUVENILE PAPILLOMA OF THE LARYNX. (Ger.) Mauch, P. J. (U. Erlangen-Nürnberg, Germany). Z. Laryng. Rhinol. Otol. 48(6):447-454, 1969.

Over a 12-yr. period, 78 pts. with papillomas of the larynx were seen, including 28 children (12 boys, 16 girls; age 0-12 yr.) with juvenile papillomatosis. Conservative surgery was performed, as the procedure least likely to permit recurrences or malignant transformation; the effects of more recent therapeutic methods (cryotherapy, ultrasound, chemotherapy, autogenous vaccines) are discussed, but long-term results are not yet available. The pediatric pts. were followed up for up to 17 yr. Some children developed recurrent papillomas, but 27/28 showed no histological progression of the tumors, all of which were of Grade I malignancy (benign papillomas without metaplasia). The only pt. in this group showing tumors of progressive malignancy was also the only pt. who had received radiotherapy (RT). This boy, first seen by the author at the age of 9 yr., had been treated elsewhere with 53 courses of RT since the age of 6 yr. (doses not stated). This pt. showed tumors with a rapid growth rate 17 yr. after the end of RT; 1.5 yr. later, a nonkeratinized squamous cell carcinoma of the larynx was found and removed by radical surgery. Two papillomas were found at the edges of a tracheostomy orifice 2 yr. later. The carcinogenic effects of RT in juvenile papillomatosis of the larynx are stressed. The possibility that this tumor is of viral etiology is also briefly discussed.

69-2764 SOLAR ULTRAVIOLET RADIATION IN RELATION TO SUNBURN AND SKIN CANCER. (E.) Robertson, D. F. (Queensland Radium Inst., Australia). S. Afr. Cancer Bull. 13(1):20-40, 1969.

This is a reprint of a previously published paper. See CRA 7(8):#1703; August, 1969.

69-2765 PRIMARY MALIGNANT TUMORS OF THE HAND. (E.) Kendall, T. E. (U. Kansas Med. Ctr., Kansas City), D. W. Robinson and F. W. Masters. Plast. Reconstr. Surg. 44(1):37-40, 1969.

From 1947-1967 (inclusive), 73 pts. with 78 separate primary malignant tumors of the hand (68 squamous cell, 8 basal cell and 2 basosquamous cell carcinomas, 1 carcinoma in situ, 2 amelanotic melanomas, 1 malignant melanoma, 2 chondrosarcomas, 1 fibrosarcoma) were seen. Histories of radiation exposure and/or chronic radiation dermatitis were noted in 15/56 pts. with squamous cell carcinoma; 5 other pts. showed tumors of possible traumatic or chemical origin. Most squamous cell carcinomas developed on the dorsum of the hand or fingers; tumors involving the palm were rare. One of the pts. with basosquamous cell carcinoma had a history of radiation exposure. No histories of previous exposure to possible carcinogenic factors are mentioned for the other 52/73 pts.

-2766 THE ROLE OF TRAUMA IN DEVELOPMENT OF
METASTATIC TUMOR. (E.) Naji, A. F.
se Western Reserve U. Sch. Med., Cleveland,
o), W. E. Bruck and D. Renner. Ohio Med. J.
(6):597-600, 1969.

men with bronchogenic carcinoma and vascular
asion developed metastatic tumors involving
aumatized soft tissues about 3 mo. after
ectomy. One pt. had undergone cholecystectomy
out 1.5 yr. before lobectomy (the chest X-ray
been normal at the time of cholecystectomy),
the metastatic tumors developed in the
rous and striated muscle tissues of the
lecystectomy scar. No involvement of the
lbladder bed or liver was noted at autopsy
mo. after the abdominal wall tumor was excised).
other pt., an alcoholic with cirrhosis,
ceived several i.m. inj. (gluteal muscle)
fore and after lobectomy, and developed
tastatic tumors at the inj. site. A third pt.
mentioned briefly: a woman undergoing
stectomy followed by therapeutic oophorectomy
wk. later) for breast cancer, who showed
tastatic involvement of the oophorectomy scar
ter an unspecified period of time. It is
ncluded that traumatization of the soft tissues
vored the spread of the tumor cells to the
aumatized tissues.

-2767 MELANOCYTOBLASTOMA OF THE RIGHT HEEL
WITH EXTENSIVE METASTATIC SPREAD INTO
BERCULOUS SCAR TISSUE OF THE UPPER LOBE OF THE
FT LUNG. (Ger.) Otto, H. (Kothen-Anhalt
sp., Germany). Materia Med. Nordmark 21(6):
2-366, 1969.

82-yr.-old man with pulmonary tuberculosis of
yr. duration (the greatest involvement was
en in the upper lobe of the left lung) noticed
dark lesion on the right heel. When the
sion was identified as a malignant melanoma a
w wk. later, mediastinal lymph node metastases
re present, and the tumor was believed to have
read to the area of tubercular involvement.
e preferential localization of malignant
lanoma in inflammatory and scar tissue (after
e tumor cells escape from the lymphatic system)
briefly discussed.

9-2768 COEXISTING CARCINOMA OF THE LUNG AND
PULMONARY TUBERCULOSIS. (E.) Gerami,
and F. H. Cole (West Tennessee Chest Dis.
osp., Memphis). Ann. Thorac. Surg. 7(4):
17-321, 1969.

rom December, 1949-June, 1967, 6622 pts. with
ulmonary tuberculosis (TB) and 316 with lung
ancer were treated at this hospital. During
his time, TB and primary carcinoma of the lung
ere confirmed in 27 pts., all males (0.78% of
he 3450 males with TB); this association was
uspected but not proved in 8 other pts.
excluded from the group). The age range in
these 27 men was 42-77 yr. TB was found several yr. before the diagnosis of cancer in 18/27; both diseases were found within the same yr. in 9/27. All but 3 pts. had smoked heavily for many yr.; 21/27 had received isoniazid (INH), alone or combined with other tuberculostatic agents, several yr. before the diagnosis of cancer. Cancer and TB were found in the same lung in 25/27; the TB was bilateral in 21/27 and unilateral in 6/27. The TB was classified as far-advanced in 10/27, moderately advanced in 15/27 and minimal in 2/27; at the time of cancer diagnosis, TB was thought to be inactive in 13/27. Tuberculin skin tests were positive in 22/27 and negative in 1 pt. (who had shown a positive test several yr. previously); 4 pts. had no records of tuberculin tests. In 1964, lung cancer death rates in the U.S. were 24/100,000 in both sexes, and 41.4/100,000 in males. Considering the different age groups, lung cancer death rates in pts. with TB were about 10 times higher than in the general population. It is suggested that the high lung cancer risk in pts. with TB may result from an interaction of such factors as smoking and other carcinogenic agents (possibly including INH) with the chronic inflammation and scarring of pulmonary TB.

69-2769 CLINICAL ASPECTS AND THERAPY OF CARCINOMA OF THE STOMACH OF ULCER ORIGIN. (Ger.) Kothe, W. (Karl Marx U., Leipzig, Germany), H. Albert and K. Nowotny. Zbl. Chir. 94(19):633-637, 1969.

From 1945-1967, 1757 pts. underwent surgery for gastric ulcers and 2590 pts. with stomach cancer were seen at this hospital. During the same period, 62 pts. (40 men, 22 women, aged 40-79 yr.) with stomach cancer developing from gastric ulcers were seen (3.5% of the pts. with ulcers, 2.4% of the pts. with stomach cancer). A "familial disposition" (not defined) was noted in 10/62. The duration of the ulcers (before the diagnosis of cancer) was 6 wk.-57 yr., usually 8-10 yr.; the av. duration was about 2 yr. less in women than in men. In 23/62 (37%), the duration was less than 1 yr. The presence of cancer was suspected in 68% of the group, because they showed histamine-refractory anacidity (36%) or subacidity (32%); 16% showed normal acidity and 16% showed hyperacidity after submax. histamine stimulation. Most pts. had undergone Billroth I or II gastrectomy (4/62 and 49/62, resp.) for ulcers. The tumors developed in the gastric antrum in 42 pts. (68%; 23/42 tumors involved the prepyloric antrum). Regional lymph node metastases were seen in 28 pts. (45.2%) and distant metastases in 7 others (11.3%).

See also abstract nos.: 2728,2729,2822,2823

69-2770 DEHYDRATION OF CHOLESTEROL DURING ACTIVATED ADSORPTION UNDER NORMAL CONDITIONS, CONTRIBUTION TO THE QUESTION OF THE ENDOGENOUS ORIGIN OF POLYCYCLIC CARCINOGENIC HYDROCARBONS. (Ger.) Wilk, M. (U. Frankfurt am Main, Germany) and W. Taupp. *Z. Naturforsch.* [*B*] 24b(1):16-23, 1969.

When cholesterol was dehydrated by selenium at 350°C, and when actively adsorbed (kieselgel) cholesterol was oxidized by iodine vapor at room temperature (20° C; the oxidation potential was about +0.4 V), alkyl-substituted cyclopentene-phenanthrenes were formed under both conditions. Since the latter experiment was conducted under approx. physiological conditions, it is concluded that a similar reaction could take place in living cells.

69-2771 PERMISSIBLE LEVELS OF OCCUPATIONAL EXPOSURE TO AIRBORNE TOXIC SUBSTANCES. SIXTH REPORT OF THE JOINT ILO/WHO COMMITTEE ON OCCUPATIONAL HEALTH. (E.) Vigliani, E. C. *WHO Techn. Rep. Ser.* (415):5-16, 1969.

Recommended criteria for determining permissible limits of airborne toxic substances include their long-term organic effects such as mutagenesis and carcinogenesis. Safe conc. zones of 25 substances (including arsine, nitro- and dinitrobenzene, di- and trinitrotoluene, beryllium and compounds, molybdenum soluble compounds and dust, vanadium pentoxide dust and fumes, ferrovanadium, zinc oxides as fumes, and chlorinated derivatives of diphenyl and diphenyloxide), recommended for international adoption, are listed.

69-2772 HODGKIN'S DISEASE IN WORKERS IN THE WOOD INDUSTRY. (E.) Spiers, P. S. (U. North Carolina, Chapel Hill). *Pub. Health Rep.* 84(5):385-388, 1969.

Data from secondary sources (U.S. white population, all ages; 1956-1965) on deaths from Hodgkin's disease (HD), lymphosarcoma + reticulum cell sarcoma (LRS), and reticulosis + mycosis fungoides + multiple myeloma (R-MP-MM), were calculated as dependent variables Y_1 (HD deaths/combined HD + LRS deaths) and Y_2 (HD deaths/combined HD + RF-MF-MM deaths), and studied by regression analysis, using 2 predictor variables: percentage of the employed white population of each State in the wood industry (X_1), and percentage of commercial forest land covered by pine forest, all species combined (X_2). The hypothetical relationship between HD and occupational exposure to pine pollen was proved correct only for males in the 37 States east of the Rocky Mountains; not for females of any region (as expected), and not for males in the 12 States west of the Rocky Mountains. This geographical variation in HD deaths in males was tentatively attributed to the fact that the pine species in eastern and western forests are widely different. Since variables X_1 and X_2 failed to predict significantly for Y_2 in any group, in contrast to the significant prediction by X_1 and X_2 for Y_1 in eastern males, it is concluded that HD (other than HD caused by pine pollen) and LRS have a similar etiology, whereas HD and diseases of the R-MF-MM group do not. It is pointed out, however, that most R-MF-MM deaths are caused by multiple myeloma, which differs in many ways from neoplasms involving primarily the lymph nodes.

69-2773 THE MUTATIONAL SPECTRUM PRODUCED IN *Drosophila* BY N-METHYL-N'-NITRO-N-NITROSOGUANIDINE. (E.) Browning, L. S. (U. St. Thomas, Houston, Tex.). *Mutat. Res.* 8(1):157-164, 1969.

Young male *Drosophila melanogaster* inj. with N-methyl-N'-nitro-N-nitrosoguanidine (MNNG) showed a high frequency of deletions of either the B or y+ markers from the y+ sc^8 .Y.B^s chromosome in both meiotic and postmeiotic cells. Both these markers or the entire Y chromosome were lost; translocations between major chromosomes were seen in meiotic or postmeiotic cells, but appeared infrequently or not at all in spermatogonia. An increase in nondisjunctional females carrying the marked Y-chromosome was seen in all stages of the male-germ line. MNNG induced point mutations at the y, dp, p^p, and st loci and seemed to cause recombinants between the dp and bw markers, and between the st and p^p markers, in the autosomes at meiosis. Germ cells at all stages of maturity showed evidence of recessive lethals in the X chromosome.

69-2774 NONRANDOM MUTAGENESIS OF THE *Escherichia coli* GENOME BY NITROSOGUANIDINE. (E.) Botstein, D. (MIT, Cambridge, Mass.) and E. W. Jones. *J. Bact.* 98(2):847-848, 1969.

A nonrandom distribution of a number of temperature-sensitive mutants, in cultures of an F^- strain (DB1032, $ara^-gal^-glpT^-xyl^-$) of *Escherichia coli* K-12, was induced by exposure to N-methyl-N'-nitro-N-nitrosoguanidine.

69-2775 CHEMICAL MUTAGENESIS IN *E. coli* B/R; THE INFLUENCE OF REPAIR SYSTEMS FOR UV DAMAGE. (E.) Clarke, C. H. (U. East Anglia, Norwich, England). *Mutat. Res.* 8(1):35-41, 1969.

In contrast to the results of UV irradiation, no marked increase in mutational yield was observed when broth-grown late lag phase cells of Escherichia coli (B/r try^- auxotroph WWP-2) were treated with either N-nitroso-N-methylurethan (NMU) or 1,2,3,4-diepoxybutane (DEB), before plating on a medium supplemented with an amino acid pool. Also in contrast to the results of UV irradiation, the presence of caffeine in the plating medium did not result in a marked increase in lethality and the concomitant increase in mutation frequency in NMU- or DEB-exposed cultures. In stationary phase, broth-grown cells, addition of caffeine or an amino acid pool (separately) had no marked effect on the mutational yield with NMU and DEB. A weak synergism was found between caffeine and an amino acid pool for DEB-induced reversions.

69-2776 MOUSE GERM CELLS AND LSD-25. (E.) Jagiello, G. (Guy's Hosp. Sch. Med., London) and P. E. Polani. Cytogenetics (Basel) 8(2):136-147, 1969.

In several experiments in male and female mice (ICI-derived strain), s.c. admin of LSD (lysergic acid diethylamide) in doses previously claimed to be teratogenic, had little or no effect on the chromosomes of the first or second meiotic divisions of either the male or female germ cells. LSD also had little or no effect on bone marrow chromosomes or on the chromosomes of a small number of spermatogonial metaphases observed.

69-2777 AN ELECTRON-MICROSCOPE STUDY OF THE ADRENOCORTICAL LESION INDUCED BY 7,12-DIMETHYLBENZ(a)ANTHRACENE IN RATS. (E.) Horváth, E. (Med. U., Szeged, Hungary), K. Kovács and D. Szabó. J. Path. Bact. 97(2): 277-282, 1969.

In Wistar rats admin. a single dose of 7,12-dimethylbenzanthracene (DMBA; 50 mg p.o.) and sacrificed 24-72 hr. later, electron microscopic examination of the inner layers of the adrenal cortex (including the zona reticularis) showed swelling of the capillary endothelial cells, with gaps and often complete destruction of the endothelial lining, and rupture of the fenestrae, at 24 hr. More widespread and severe damage was seen at 48 hr. These alterations were essentially the same at 72 hr., unless hemorrhage occurred. Parenchymal cells surrounding the ruptured capillaries became necrotic in some cases, suggesting that DMBA-induced necrosis is due to ischemia (resulting from capillary endothelial cell injury).

69-2778 EFFECT OF dl-ETHIONINE AND NATURALLY OCCURRING AMINO ACIDS ON ADRENAL NECROSIS INDUCED BY 7,12-DIMETHYLBENZ[a] ANTHRACENE AND ITS 7-HYDROXYMETHYL DERIVATIVE IN FEMALE SPRAGUE-DAWLEY RATS. (E.) Wheatley, D. N. (U. Med. Bldgs., Aberdeen, Scotland). Brit. J. Exp. Path. 50(1):78-83, 1969.

Female Sprague-Dawley rats were treated with DL-ethionine (E) and various amino acids (125 mg), up to 4 days prior to the admin. of 7,12-dimethylbenzanthracene (DMBA; 3 mg i.v.) or 7-hydroxymethyl-12-methylbenzanthracene (7-OHM-MBA; 15 mg/ml in olive oil, p.o.). A pretreatment interval of 1 day or less was insufficient for E to prevent DMBA-induced adrenal necrosis, but was sufficient for the protective effects of DL-methionine (M) and glycine (G). Treatment with E at 3 days and (to a lesser extent) 4 days before DMBA protected against necrosis, but was an ineffective time for M. Admin. of equal doses of M + E, 3 days before DMBA, had no protective effect. The protective effects of G (admin. up to 24 hr. before DMBA) were abolished by large doses but not by small doses of arginine (10/10 and 1/10 rats admin. 250 or 125 mg of arginine, resp., showed necrosis). None of these treatments had any effect on 7-OHM-MBA-induced adrenal necrosis.

69-2779 PROGESTERONE METABOLISM BY ADRENAL HOMOGENATES OF RATS TREATED WITH 7,12-DIMETHYLBENZ[a]ANTHRACENE. (E.) Dale, E. (Emory U., Atlanta, Ga.) and F. D. Scutchfield. Brit. J. Exp. Path. 50(2):165-171, 1969.

Adrenals were removed from female Sprague-Dawley rats 1-14 days after treatment with 7,12-dimethylbenzanthracene (DMBA; 20 mg p.o.) homogenized and incubated with substrate containing ^{14}C-labeled progesterone. Initial decreased plasma corticosterone (CS) levels were observed. The percentage conversion of the original substrate to CS was greatly reduced in preparations from DMBA-treated rats, although the increase in DOC was not proportionate; chromatography of the neutral fraction also showed an initial CS-deoxycorticosterone (DOC) pattern different from that seen in untreated controls. These results indicated partial destruction of the hydroxylating enzymes necessary for synthesis of the adrenal steroids, but did not indicate a causal relationship between DMBA-induced cancer and alteration of steroid hormone biosynthesis.

69-2780 INFLUENCE OF AGE AND SEX ON THYROIDITIS IN RATS INJECTED SUBCUTANEOUSLY WITH 3-METHYLCHOLANTHRENE. (E.) Glover, E. L. (U. Maryland, College Park), M. D. Reuber and S. Grollman. Path. Microbiol. (Basel) 32(6): 314-320, 1968.

In inbred male or female Buffalo rats (1-52 wk. old), s.c. admin. of 3-methylcholanthrene (2-4 mg in 0.2 ml corn oil) induced thyroiditis in 4-, 12- and 24-wk.-old females more often than in males of the same age, or in females 1 and 52 wk. old. The 12-wk.-old females developed the highest incidence of thyroiditis. No significant age difference in the development of thyroiditis was seen in males.

69-2781 THE CRITICAL SENSITIVITY OF THE DEVELOPMENTAL PHASE AND THE ORGANOTROPIC ACTION OF DIFFERENT TERATOGENIC AGENTS; RECEPTORS OF MORPHOGENESIS IN THE MAMMALIAN EMBRYO. (E.) Von Kreybig, T. (U. Tübingen, Germany). *Excerpta Med. Int. Congress Ser.* 173:152-159, 1969.

In the offspring of rats admin. effective teratogenic doses of 3 nitrosourea derivatives (N-methyl-, N-ethyl-, or N,N,N'-trimethyl-N-nitrosourea), 2 nitrogen mustards, 2 carbonamides (N-methylformamide or N-methylacetamide) or 2 hydroxamic acid derivatives on day 13 of gestation, the malformation syndromes varied widely from 1 group of agents to another, and between agents in the same structural group. The destruction occurred only in the blastemata and reached a max. after 2-3 days, depending on the agent applied. The observed embryopathies revealed the different organotropy of the molecules; for example, the nitrosoureas showed a distinct encephalotropic action.

69-2782 STUDIES ON CHEMICAL CARCINOGENS. VIII. THE STRUCTURE-CARCINOGENICITY RELATIONSHIP AMONG DERIVATIVES OF 4-NITRO- AND 4-HYDROXYAMINO-QUINOLINE 1-OXIDES (SUPPLEMENT). (E.) Kawazoe, Y. (Nat. Cancer Ctr. Res. Inst., Tokyo), M. Araki and W. Nakahara. *Chem. Pharm. Bull. (Tokyo)* 17(3):544-549, 1969.

The carcinogenic activities of 23 derivatives of quinoline 1-oxide after s.c. inj. were studied in mice. The molecular structure considered essential for tumor induction was $R_1(R_2)$-N-O-R_3, where R_1, R_2 and R_3 were hydrogen, alkyl, aryl or acyl, and where R_1 may be an aryl group. The reactivity of this group can be affected by the electronic and steric properties of the rest of the molecule, and by the physical and chemical properties of the entire molecule (including specificity in enzyme reactions and lipophilic-hydrophilic properties).

69-2783 DIFFERENTIAL SENSITIVITIES TO A CHEMICAL CARCINOGEN (4-NITROQUINOLINE N-OXIDE) IN MAMMALIAN CELL LINES *IN VITRO*. (E.) Horikawa, M. (Kyoto U., Japan), O. Nikaido and T. Sugahara. *Exp. Cell Res.* 55(1):65-67, 1969.

Mouse L cells were the most sensitive to 4-nitroquinoline N-oxide (NQO) *in vitro* and porcine kidney stable (PS) cells were the most resistant of 3 cell lines; Ehrlich ascites carcinoma cells showed an intermediate sensitivity. All 3 lines showed identical rates of incorporation of ^{3}H-NQO. NQO sensitivity was not related to UV sensitivity. It is suggested that the differing sensitivities to NQO may be based on different capacities to reduce NQO to the highly carcinogenic but less cytotoxic intermediate, 4-hydroxyaminoquinoline N-oxide, in these cell lines.

69-2784 PROPERTIES OF HAMSTER EMBRYONIC CELLS TRANSFORMED BY 4-NITROQUINOLINE-1-OXIDE *IN VITRO* AND THEIR CORRELATIONS WITH THE MALIGNANT PROPERTIES OF THE CELLS. (E.) Kakunaga, T. (Osaka U., Japan) and J. Kamahora. *Biken J.* 11(4):313-322, 1968.

The ability of hamster embryonic cells malignantly transformed by 4-nitroquinoline-1-oxide (NQO) to form colonies in soft agar was well correlated with their ability to grow as tumors in 3-4-wk.-old golden hamsters. This colony-forming ability served as an *in vitro* assay of the malignancy of the NQO-transformed cells. Other properties of the transformed cells, such as morphology (fibroblasts or epithelial-like cells), focus formation (in mixed cultures with normal hamster embryonic cells), parameters of cell proliferation (doubling time, mitotic index, durations of the different phases of the mitotic cycle), cloning efficiency, and resistance to the cytotoxic effects of NQO, were less well correlated to their tumor-forming capacities.

69-2785 DETERMINATION OF NICOTINE IN CIGARETTE SMOKE BY A MODIFIED SPECTROPHOTOMETRIC METHOD. (It.) Scassellati Sforzolini, G. (U. Perugia, Italy) and A. Savino. *Riv. Ital. Ig.* 28(1-2):31-42, 1968.

A method is described for determining the nicotine content of cigarette smoke, using an overload method in which aliquots of the distillate to be assayed are combined with distilled water (1.5 ml) and 1.5 ml of an aqueous soln. containing 1/5 different conc. of pure nicotine (0-40 μg/ml) prior to UV spectrophotometric assay. Graphing the results of these 5 assays in a special way reduced the error in the final result to ±0.10-0.75%; compared to ±12.5-21.5% for the spectrophotometric method (Willits et al.) and ±2.0-3.6% for the traditional gravimetric method.

69-2786 EVALUATION OF A RAPID INDEX OF ENVIRONMENTAL POLLUTION BY CIGARETTE SMOKE, WITH SPECIAL REFERENCE TO THE COMPOSITION OF THE GASEOUS PHASE OF THE SMOKE. (It.) Scassellati Sforzolini, G. (U. Perugia, Italy) and A. Savino. *Riv. Ital. Ig.* 28(1-2):43-55, 1968.

The carbon monoxide (CO) and carbon dioxide (CO_2) contents of the smoke from 3 brands of cigarettes (each was tested with or without a filter) showed no demonstrable correlation with changes in nicotine or tar content, whether the smoke was "inhaled" or passed into the air by way of the side-stream. Neither the CO nor the CO_2 content was significantly affected by filtering, although the total gaseous content was somewhat reduced when 1 of the brands was double-filtered. In general, the CO and CO_2 contents were inversely proportional to each other. The CO content of smoke from an unfiltered cigarette was higher for the middle third of the cigarette than for the initial and final thirds; in smoke from a filtered cigarette, the CO conc. of the smoke increased as the cigarette burned down. When an entire pack of cigarettes was smoked inside a car with all windows closed, the max. permissible conc. of CO (110 mg/m^3 air; approx. equal to the CO of the smoke from 5 cigarettes) was attained, although the conc. of ammonium and nitrogen compounds did not reach toxic levels. It is concluded that the extent of air pollution by cigarette smoke can be reliably determined by measuring CO alone, using the Draeger system.

69-2787 THE ANTICILIOSTATIC EFFECT OF CIGARETTES TREATED WITH OXOLAMINE CITRATE. (E.) Dalhamn, T. (Karolinska Inst., Stockholm). Amer. Rev. Resp. Dis. 99(3):447-448, 1969.

In cats smoking unfiltered or cellulose acetate-filtered cigarettes, ciliostasis was seen after means of 20 and 33 puffs, resp. When oxolamine citrate (OC) was added to the cigarettes (5% by wt.), ciliostasis developed after means of 39 and 45 puffs, resp. The anticiliostatic effects of both OC and the filter were regarded as significant. It is suggested that OC may affect ciliary activity or mucus secretion or both.

69-2788 ALTERATIONS OF LUNG DEFENSE MECHANISMS AGAINST AIRBORNE BACTERIA. (E.) Rylander, R. (Nat. Inst. Pub. Health, Stockholm). Arch. Environ. Health (Chicago) 18(4):551-555, 1969.

Mechanical elimination of viable bacteria (by mucous transport) and the bactericidal mechanisms of the lungs were determined in guinea pigs, by measuring the retention and elimination of aerosols of viable or radioactive (killed) bacteria. Inhalation of SO_2 (10 ppm) for 4 wk. had little or no effect, but exposure to carbon black (15 mg/m^3 air) reduced the bactericidal activity; exposure to both SO_2 and carbon black had a synergistic depressing effect on mechanical elimination of the bacteria. In another group of animals exposed to smoke from unfiltered, high-tar cigarettes for 3 wk., mechanical elimination of viable bacteria was reduced and the bactericidal mechanism was also probably impaired. The importance of studying the combined effects of particulate air pollutants on different pulmonary defense mechanisms is discussed.

69-2789 SMOKER'S LEUKOKERATOSIS. (Ger.) Matras, H. Fortschr. Kiefer. Gesichtschir. 13:151-156, 1968.

Five men with leukokeratosis and/or leukoplakia of the oral cavity resulting from prolonged (12-42 yr.) heavy smoking are described. The 2 youngest pts. (34 or 39 yr. old) showed localized gingival lesions; the older pts. (56-58 yr. old) showed more widespread lesions. One pt. was a cigarette smoker (30 cigarettes/day); the others had smoked pipes for many yr. Poorly cured tobacco was considered as an etiologic factor for 3 pipe smokers, 2 of whom had cured their own tobacco for 6-over 10 yr. Two of the older pts. showed malignant transformation of the lip (papillary carcinoma) or sublingual region (carcinoma); the pt. with sublingual carcinoma had developed syphilis 35 yr. previously. Chronic traumatization of the affected areas was reported by both pts. with malignant transformation.

69-2790 FUNGUS CONTAMINANTS OF AFRICAN FOOD PRODUCTS. (Fr.) Toury, J. (Fac. Med. Pharm., Dakar, Senegal), R. Giorgi, G. Monjour, C. Quenum, M. Delassus, P. Goarin and R. Valette. C.R. Soc. Biol. (Paris) 162(7):1462-1463, 1969.

Aflatoxin was demonstrable in 25% of all samples of African kidney beans, in quantities ranging from 0.03-0.30 ppm. Aflatoxin conc. were 0.03-2.00 ppm in both African rice and in the soil of the paddies in which it was grown; 0.03-0.04 ppm in millet and sorghum; and 0.08-0.40 ppm in corn (maize). None was found in manioc or sweet potato samples, although the chromatograms showed a blue spot below the R_f for aflatoxin, possibly indicating the presence of Ceratocystis fimbriata on the tubercles (although the same blue spot was seen when Macrophomina phaseoli or Botrioplodia theobromae was present in a sample). In 1-day-old ducklings, 4 days of aflatoxin admin. (30 μg/day p.o.) was usually fatal; death was preceded by anorexia and loss of neuromuscular control. In ducklings surviving this dosage (and in birds receiving smaller doses), wt. gain was severely retarded, liver vol. was reduced and liver necrosis was occasionally noted. Feed cakes contaminated with Aspergillus flavus (conc. not stated) were also lethally toxic. Feeds contaminated with Aspergillus niger, Penicillium, Botrioplodia, or Macrophomina phaseoli were not lethally toxic and did not induce liver necrosis, although varying degrees of hepatic periportal proliferation were noted.

69-2791 DETERMINATION OF AFLATOXINS IN FOOD BY ABSORPTION SPECTROMETRY. (E.) Agthe, C. (WHO, Geneva, Switzerland), W. Lijinsky and D. Oremus. Food Cosmet. Toxic. 6(5):627-631, 1968.

Foods with added aflatoxins B_1 and G_1 were extracted with acetone; the extracts were purified by silica gel column chromatography and thin-layer chromatography on silicic acid. Absorption spectra were measured from 400-250 mμ (max. values were seen at 363 and 265 mμ) on a recording spectrophotometer. Recoveries of the aflatoxins were in the range of 40-67% at a sensitivity of 0.03 ppm.

69-2792 A SIMPLE BIOASSAY FOR DETECTION OF AFLATOXIN IN MILK. (E.) Mayer, A. M. (Hebrew U., Jerusalem) A. Polijakoff-Mayber, P. Robinson, and I. Slowatizky. Toxicon 7(1): 13-14, 1969.

When small drops of aflatoxin-contaminated milk were placed on detached chlorophyll-deficient 12-day-old maize leaves, before 19 hr. of exposure to whitelight, virescence was prevented. Spectrophotometric measurement of the chlorophyll content or reflectometer measurement of light reflectance from the surface of the leaves, provided a good quantitative test for aflatoxin.

69-2793 EXCRETION OF AFLATOXIN IN A LACTATING COW. (E.) Allcroft, R. (Cent. Vet. Lab., New Haw, Weybridge, England), B. A. Roberts and M. K. Lloyd. Food Cosmet. Toxic. 6(5):619-625, 1968.

In a lactating cow, admin. a single p.o. dose (0.5 mg/kg) of a mixture of aflatoxins B_1 (44%), G_1 (44%) and B_2 (2%), only 4.52% of the total dose was identified in the milk (0.18%), urine (1.55%) and feces (2.79%) in the next 9 days. About 85% of the total aflatoxin detected in the milk and urine was excreted in the first 48 hr. None was detectable in the milk after 4 days, or in the urine or feces after 6 days. The major aflatoxin excretion products were M_1 in milk (0.35% of the total dose of B_1) and urine, and B_1 in feces. Aflatoxin G_1 was detected in the urine and (in smaller quantities) feces, but not in the milk. Aflatoxin excretion patterns were basically similar to those seen in the ewe; the chief difference was a greater excretion of unchanged B_1 in the cow than in the ewe.

69-2794 ORAL TOXICITY OF THE OIL-SOLUBLE TAR COLOR TOLYLAZONAPHTHYLAMINE (OIL YELLOW OB). (Jap.) Ohtsuka, Y. (Chiba U., Japan). Jap. J. Hygiene 23(6):501-513, 1969.

In mice, the acute p.o. LD_{50} of Oil Yellow OB (OY-OB) could not be determined because of its insolubility, but single doses of 3.8 g/kg were lethally toxic to 40%. Signs of liver damage (diffuse enlargement of the liver cells, a high mitotic rate and/or focal necrosis) were seen in all mice sacrificed after 10 days. In rats fed OY-OB (0.5% or 0.75% in the diet) for 3 mo., irregular arrangements and enlargement of the liver cells (sometimes with mitotic figures) were seen in the early stages. Massive liver necrosis and collapse were noted in the later stages; many animals showed thrombi of the portal vessels. In rats fed OY-OB (0.1-2.0% in the diet) for 2 yr., doses over 0.25% were highly toxic, whereas the 0.1% dose caused only slight growth retardation. All doses over 0.25% caused marked centrolobular necrosis (followed by fibrosis and cirrhosis) of the liver. Some animals showed nodular hyperplasia of the liver, and 1 rat admin. the 0.25% dose and sacrificed at 53 wk. showed atypical proliferation of the liver cells. Pathological changes in the heart and kidneys were noted in some animals.

69-2795 STUDIES ON THE INCORPORATION OF δ-AMINOLEVULINIC ACID INTO MICROSOMAL HEMOPROTEIN: EFFECT OF 3-METHYLCHOLANTHRENE AND PHENOBARBITAL. (E.) Levin, W. (Burroughs Wellcome Co., Inc., Tuckahoe, N. Y.) and R. Kuntzman. Life Sci. 8(6,Pt.2):305-311, 1969.

In livers of immature male Long-Evans rats treated i.v. with Δ-aminolevulinic acid (DALA) labeled with ^3H in positions 3 and 5, the label was incorporated into the heme moiety of microsomal hemoprotein. The label demonstrated in the "CO-binding particles" was also incorporated into hemoprotein. In the livers of normal animals, the label seen in the CO-binding particles decreased from 2-72 hr. after DALA admin. Pretreatment with 3-methylcholanthrene (MC; 25 mg/kg) retarded this decrease in label in CO-binding particles, but phenobarbital pretreatment had no effect. It is suggested that MC does not cause stabilization of the hemoprotein, but rather causes a change in the composition of the hemoprotein in the CO-binding particles.

69-2796 STUDIES ON RAT LIVER RIBONUCLEASES. IV. LIVER RIBONUCLEASES IN DEVELOPING, 2-ACETYLAMINOFLUORENE FED AND PARTIALLY HEPATECTOMIZED RATS. (E.) Rahman, Y. E. (Argonne Nat. Lab., Ill.), E. A. Cerny and C. Peraino. Biochim. Biophys. Acta 178(1):68-73, 1969.

Activities of RNase I (acid RNase), RNase II and RNase III in the livers of fetal, newborn and suckling SD/Anl rats were elevated during the period of rapid growth, and decreased to adult levels at age 30-40 days. Little change in acid phosphatase activity was seen during this time. In another experiment in 30-day-old rats, acid phosphatase was specifically depressed and RNase I was activated during the early stages of 2-acetylaminofluorene feeding (0.01-0.02% in the diet for 140 days). RNase I remained elevated throughout the observation period, whereas RNase II and RNase III, after an initial increase in activity, decreased steadily to control levels. In another experiment, partial hepatectomy caused a prompt increase in all 3 types of RNase activity. After reaching a 4-hr. peak, RNase II activity decreased while activities of RNase I and RNase III remained moderately elevated. Indirect evidence is presented, suggesting that RNase II is responsible for the degradation of messenger RNA in the liver *in vivo*.

9-2797 ACTIVATION OF GENETIC TRANSCRIPTION IN RAT LIVER CHROMATIN BY 3-METHYL- HOLANTHRENE. (E.) Bresnick, E. (Baylor U. ch. Med., Houston, Tex.) and H. Mossé. Molec. harmacol. 5(3):219-226, 1969.

t is suggested that the increased activity of he "aggregate" RNA polymerase of rat liver uclei after i.p. admin. of 3-methylcholanthrene MC; 20 mg/kg) results primarily from activation f some region(s) of the genome. This effect of C, or a derivative, on template efficacy may be receded by combination of MC with a receptor olecule.

9-2798 EXCEPTIONAL SENSITIVITY OF MINK TO THE HEPATOTOXIC EFFECTS OF DIMETHYL- ITROSAMINE. (E.) Carter, R. L. (Roy. Cancer osp., London), W. H. Percival and F. J. C. Roe. . Path. 97(1):79-88, 1969.

ale 15-wk.-old mink fed very low conc. of imethylnitrosamine (2.5 or 5.0 ppm in diet) howed lower food consumption than controls, eveloped acute toxic changes in the liver, and ied after 32-34 and 23-28 days, resp. Other oxic effects included polydypsia, ascites and .i. hemorrage. Histopathological changes in he liver included hepatocyte degeneration and ecrosis with increased intracellular fat. light to moderate bile duct epithelium proliferaion was also seen. No signs of parenchymal egeneration were noted.

9-2799 EFFECTS OF DIET AND MICROSOMAL ENZYME INDUCTION ON THE TOXICITY OF DIMETHYL ITROSAMINE. (E.) McLean, A. E. M. (Univ. oll. Hosp. Med. Sch., London) and H. G. 'erschuuren. Brit. J. Exp. Path. 50(1):22-25, 969.

orton or Carworth albino rats maintained on a rotein-free diet were protected against the ethal effects of dimethylnitrosamine, even when hey were pretreated with phenobarbital or DT (which can restore microsomal enzyme activity) r starvation. The failure of DDT or phenoarbital to reverse this effect of the proteinree diet suggested that carcinogen-induced iver damage did not depend upon either the rate r the amount of carcinogen metabolized.

9-2800 MITOTIC ABNORMALITIES IN PROLIFERATING HEPATOCYTES INDUCED BY THIOACETAMIDE T CERTAIN PERIODS AFTER PARTIAL HEPATECTOMY. (E.) Mironescu, St. (Inst. Endocrin., Bucharest). xp. Cell Res. 55(3):435-437, 1969.

xamination of hepatocytes from regenerating liver f male Sprague-Dawley rats, inoc. with thioacetamide (TAA; 150 mg/g) from 10-26 hr. after artial hepatectomy, showed phases of different ensitivity toward the ability of TAA to induce mitotic abnormalities (especially bridges during anaphase and telophase). The results suggested that liver cells in the phase of stimulated DNA synthesis were highly sensitive to TAA, whereas cells that had completed DNA synthesis and were proceeding toward division were less sensitive. The prereplicative phases were somewhat less sensitive than the DNA-synthesizing stages.

69-2801 PITUITARY HORMONES AND THE MECHANISM OF INDUCTION OF LIVER CANCER WITH N-HYDROXY-N-2-FLUORENYLACETAMIDE. (E.) Weisburger, J. H. (NCI, Bethesda, Md.) S. R. Pai, R. S. Yamamoto, J. Korzis and E. K. Weisburger. Israel J. Med. Sci. 4(6):1223-1229, 1968.

In 4-wk.-old male or female Fisher F344 rats receiving a diet containing N-hydroxy-N-2-fluorenylacetamide (N-OH-FAA; 80-320 ppm for 8-14 wk.), s.c. implantation of the Furth mammotropic pituitary tumor MtT/F4 (its hormones were permitted to act for 10-13 wk.) slightly enhanced liver tumor induction in females, but had no noticeable effect in males. Implantation of this tumor had only a slight enhancing effect on N-OH-FAA carcinogenesis in orchiectomized males and oophorectomized females. It is suggested that pituitary hormones act mainly on carcinogen metabolism (rather than by an endocrine-mediated effect) in normal or abnormal liver cells.

69-2802 CARCINOGENITY OF PONCEAU MX IN THE MOUSE. (E.) Ikeda, Y. (Nat. Inst. Hyg. Sci., Tokyo) S. Horiuchi, K. Kobayashi, T. Furuja and K. Kohgo. Food Cosmet. Toxic. 6(5):591-598, 1968.

Ponceau MX, a red food coloring (disodium salt of 1-(2,4-xylylazo)-2-naphthol-3,6-disulfonic acid), was fed to male and female ddY mice (0.2-5.0% in diet) for up to 19 mo. The toxic effects of this dye (increased mortality rates, decreased body growth, increased relative liver and kidney wt., non-neoplastic pathological changes in the kidney tubules) were dose-dependent, and somewhat greater in males than in females. Liver cell hypertrophy was seen in nearly all animals fed the dye for 12 mo. or more. In 26 females and 50 males treated for 12-19 mo., additional changes in the liver included hyperplastic nodules (5/26 and 13/50, resp.), hepatocellular adenomas (5/26 and 4/50, resp.; 1/31 female and 1/34 male controls also showed adenomas), and hepatocellular carcinomas (10/26 and 14/50, resp.). Some mice with hepatocellular carcinomas also developed cholangiomas. Other tumors seen in some treated animals included lung adenomas and lymphosarcomas. The liver tumor incidence was dose-dependent. It is suggested that the carcinogenicity of this azo dye might result from the presence of relatively large amounts of the pseudocumidine and 2,4-xylidine derivatives.

69-2803 MODES OF ACTION OF THREE BACTERIOSTATIC AGENTS IN THEIR INHIBITORY EFFECT ON INDUCTION OF HEPATOMA IN RATS FED 4-(DIMETHYLAMINO)AZOBENZENE. I. EFFECT ON METABOLIC FATE OF 4-(DIMETHYLAMINO)AZOBENZENE. (E.) Miyaki, K. (Chiba U., Japan), M. Akao, K. Terao and K. Kuroda. Gann 60(2):167-179, 1969.

The formation of complexes between 4-(dimethylamino)azobenzene (DAB; 0.06% in diet) and liver proteins in male Donryu rats was prevented by addition of dehydroacetic acid (0.25%), 2-(2-furyl)-3-(5-nitro-2-furyl)acrylamide (AF-2; 0.2%) or p-hydroxypropiophenone (1.0%) to the DAB-containing diets. Inhibition of DAB-induced liver carcinogenesis by these agents paralleled this inhibition of complex formation. These effects were related to the participation of these agents in DAB metabolism. AF-2 had the greatest effect on the conc. of DAB and its azo dye metabolites (in the blood as well as the liver); if AF-2 was admin. for more than 3-4 mo., hepatic DAB metabolism was also reduced.

69-2804 BIOCHEMICAL AND HISTOLOGICAL STUDIES OF MINIMAL-DEVIATION HEPATOMAS INDUCED BY 4-DIMETHYLAMINO AZOBENZENE (DAB). (Rum.) Chiricută, I. (Inst. Oncol., Cluj, Rumania), I. Mustea, O. Bojan and G. Simu. Oncol. Radiol. 7(3):227-235, 1968.

Livers from albino rats treated with 4-dimethylaminoazobenzene (DAB; 10 mg/day in diet or by gastric intubation) for 12 mo. were compared to livers from untreated rats. Histological examination of the livers of 85 DAB-treated rats showed 7 preneoplastic lesions and 5 hepatomas. The only biochemical change noted in the livers of DAB-treated rats that was significantly different from the control tissues (in vitro and in vivo) was an increase (mean, 4.84%) in the rate of aerobic glycolysis in the presence of glucose; other biochemical changes noted (decreases in respiration, the Crabtree effect and aerobic glycolysis in the absence of glucose) were insignificant. Glucose-6-phosphate dehydrogenase activity remained substantially unchanged. During the development of preneoplastic lesions and hepatomas, hepatic levels of free cystine, alanine and leucine decreased. It is concluded that these DAB-induced tumors should be classified as minimal-deviation hepatomas of the Morris type.

69-2805 HEPATOCELLULAR ADAPTATION AND INJURY. STRUCTURAL AND BIOCHEMICAL CHANGES FOLLOWING DIELDRIN AND METHYL BUTTER YELLOW. (E.) Hutterer, F. (Mt. Sinai Sch. Med., City U. New York, N. Y.), F. M. Klion, A. Wengraf, F. Schaffner and H. Popper. Lab. Invest. 20(5):455-464, 1969.

Continued admin. of dieldrin to female Sprague-Dawley rats (2 mg/kg/day) initially caused an increase in liver wt. and in levels of microsomal protein, smooth endoplasmic reticulum, activities of several drug-mobilizing enzymes (aniline hydroxylase and p-nitroreductase) and the conc. of P-450 hemoprotein in the liver. This was followed by a steady-state phase, with tolerance to usually fatal dieldrin doses. In the third phase (decompensation), the activities of drug-mobilizing enzymes decreased, but the increased levels of the other parameters persisted. During this phase the smooth endoplasmic reticulum was hypoactive and hypertrophic, and morphological and biochemical changes were seen in the mitochondria. A short induction phase, an insignificant steady state and rapid decompensation were noted in the livers of rats fed 3'-methyl-4-dimethylaminoazobenzene (0.064% in diet). It is suggested that the appearance of a hypoactive, hypertrophic smooth endoplasmic reticulum, before hepatocyte changes become visible under the light microscope, may reflect the borderline between the adaptation and toxic responses of the liver.

69-2806 SEQUENTIAL ALTERATIONS IN MITOCHONDRIAL INNER AND OUTER MEMBRANE ELECTRON TRANSPORT AND IN RESPIRATORY CONTROL DURING FEEDING OF AMINO AZO DYES; STABILITY OF PHOSPHORYLATION. CORRELATION WITH SWELLING-CONTRACTION CHANGES AND TUMORIGENESIS THRESHOLD. (E.) Arcos, J. C. (USPHS Hosp., New Orleans, La.) M. J. Tison, H. H. Gosch and J. A. Fabian. Cancer Res. 29(6):1298-1306, 1969.

In liver mitochondria from rats fed 3'-methyl-4-dimethylaminoazobenzene (3'-MeDAB; 0.06%), oxidative phosphorylation remained normal throughout the 16-wk. feeding period, while respiratory control decreased during the first 7 wk.; these patterns were similar when pyruvate (P), glutamate (G) and α-ketoglutarate (α-KG) were used as substrates. Diaphorase activity (1/2 of the outer membrane-localized electron transport segments) showed a sharp minimum at 4 wk., coinciding with the onset of irreversible histological changes and with the minimal degrees of mitochondrial swelling and contraction. Reduced nicotinamide adenine dinucleotide ($NADH_2$) oxidation ($NADH_2$ cytochrome c reductase activity) was not minimal at 4 wk., but a temporary, marked increase in activity was seen from 5 wk. on, peaking at 7 wk. This high rate of $NADH_2$ oxidation was also largely observed in mitochondria from 3'-MeDAB-induced hepatomas. The hepatoma mitochondria showed partial or complete uncoupling of oxidative phosphorylation, varying from 1 tumor to another; respiratory quotients (QO_2) were significantly below normal when P and G were used as substrates. In liver mitochondria from rats fed 2-methyl-4-dimethylaminoazobenzene (2-MeDAB; 0.06%), oxidative phosphorylation decreased very slightly throughout the 10-wk. feeding period. Unlike 3'-MeDAB, 2-MeDAB caused a marked decrease in the QO_2 using G or P as substrates (throughout the feeding period), whereas the QO_2 with α-KG increased gradually and moderately, peaking at 6 wk. Changes in $NADH_2$ oxidation in liver mitochondria from 2-MeDAB-fed rats were either absent, or entirely different from those induced by 3'-MeDAB.

69-2807 PATHOLOGICAL LESIONS, INCLUDING TUMORS, IN RATS AFTER 4,4'-DIAMINODIPHENYLMETHANE AND γ-BUTYROLACTONE. (E.) Schoental, R. (Med. Res. Council Lab., Carshalton, Surrey, England). Israel J. Med. Sci. 4(6):1146-1158, 1968.

In weanling white rats, p.o. admin. of 4,4'-diaminodiphenylmethane (DDM), a common industrial epoxy resin hardener (40-100 mg in 2-5 doses, p.o.), induced 1 hepatoma and 1 kidney hemangioma among 8 male rats, compared to 1 uterine adenocarcinoma and 2 mammary tumors among 8 females; pituitary tumors were seen in 1/8 and 5/8, resp. Many toxic liver and kidney lesions were also observed in these rats, as well as in a small group of CFW mice admin. DDM. Distillation of hardener yielded γ-butyrolactone (GBL), a solvent. Of 12 rats admin. GBL (200-900 mg/kg in 4 p.o. doses over 7.5 mo.), 6/12 were alive after 18 mo.; 5/6 showed various tumors and 1/6 showed heart and kidney calcification. In view of the demonstrated hepatotoxic effects of DDM in man (the 1965 outbreak of "Epping jaundice," traced to bread made of flour contaminated by DDM in GBL), it is suggested that DDM may be a carcinogen in man. The suggested use of GBL in anesthesia should be reconsidered, especially in view of its possible metabolism to an α,β-unsaturated lactone.

69-2808 RENAL EPITHELIAL NEOPLASMS INDUCED IN MALE WISTAR RATS BY ORAL AFLATOXIN B_1. (E.) Epstein, S. M. (U. Pittsburgh Sch. Med., Pa.), B. Bartus and E. Farber. Cancer Res. 29(5):1045-1050, 1969.

Male Wistar rats were fed purified aflatoxin B_1 (AB; 0.25-1.0 ppm in diet) for 147 days, and kept under observation until the first liver and/or kidney tumors were seen. The incidence of papillary tumors of the kidney (resembling adenocarcinomas of the kidney in man) increased from 23% (3/13) at 0.25 ppm of AB to 57% (8/14) at the 1.0 ppm dosage. The incidence of malignant hepatoma increased from 62% (8/13) at the lowest dosage to 86% (12/14) at the highest dosage. Both liver and kidney tumors were noted in 11 rats; 5 others showed only kidney tumors. The mean times from the beginning of the experiment to the diagnosis of liver and kidney tumors ranged from 742 and 783 days, resp., in rats admin. 0.25 ppm of AB, to 611 and 603 days, resp., in rats admin. 1.0 ppm of AB. Other tumors seen in treated rats included 1 squamous cell carcinoma of the lung, 1 undifferentiated submandibular sarcoma and 2 benign s.c. fibromas. No tumors developed in untreated controls.

69-2809 BACTERIA AND THE AETIOLOGY OF CANCER OF THE LARGE BOWEL. (E.) Aries, V. (St. Mary's Hosp. Sch. Med.) J. S. Crowther, B. S. Drasar, M. J. Hill, and R. E. O. Williams. Gut 10(5):334-335, 1969.

Fecal specimens from 40 healthy English adults and 48 healthy Ugandan adults showed a wide variation in relative bacterial count. By comparison to the specimens from the Ugandans, the specimens from the English subjects showed much higher counts of Bacteroides and Bifidobacterium, much lower counts of enterococci, lactobacilli, aerobic streptococci and yeasts, and about the same counts of clostridia, veillonellae and filamentous fungi. Bacteroides and Clostridium strains isolated from the 2 groups of subjects were equally active in degrading bile salts, but the specimens from the English subjects showed much more degradation of the bile salts than the specimens from the Ugandans. This difference in fecal flora was attributed to a marked difference in diet (mixed animal and vegetable foods in the English; predominantly vegetarian, with high carbohydrates, very little fat and almost no animal protein, in the Ugandans). Evidence suggesting the possibility of conversion of bile salts into carcinogens by intestinal bacteria (notably Bacteroides) is briefly discussed. It is suggested that the wide variation in the frequencies of cancer of the large intestine (high in developed nations such as England; low in underdeveloped countries such as Uganda) may be related to this diet-dependent variation in intestinal flora.

69-2810 ULTRASTRUCTURE OF THE DERMAL-EPIDERMAL JUNCTION IN EXPERIMENTALLY INDUCED TUMORS AND HUMAN ORAL LESIONS. (E) Woods, D. A. (Roy. Coll. Surg., London) and C. J. Smith. J. Invest. Derm. 52(3):259-263, 1969.

Cheek pouches of Syrian golden hamsters were painted with 0.5% 7,12-dimethylbenzanthracene (DMBA; 3 doses/wk.). After a minimal latent period of 9 wk. an inflammatory reaction was seen, followed by the development of epithelial hyperplasia and discontinuities in the lamina densa. Progressive infiltration of the connective tissue by pseudopodia from the basal epithelial cells was noted; proliferation of the pseudopodia was correlated with dissolution of the subepidermal connective tissue. Tumors developed in animals admin. DMBA for 3 mo., then left untreated for 3 mo.; these tumors showed dermal pseudopodial infiltration and the histological characteristics of invasive squamous cell carcinoma. A similar dermal-epidermal tissue interaction was observed in hyperkeratotic human oral mucosa, and in clinically normal mucosa overlying unerupted impacted teeth.

69-2811 QUANTITATIVE STUDIES ON THE MALIGNANT TRANSFORMATION OF MOUSE PROSTATE CELLS BY CARCINOGENIC HYDROCARBONS IN VITRO. (E.) Chen, T. T. (Indiana U. Med. Ctr., Indianapolis) and C. Heidelberger. Int. J. Cancer 4(2): 166-178, 1969.

When aneuploid cell lines from C3H mouse prostate, plated on feeder layers of C3H mouse embryonic fibroblasts, were exposed to various polycyclic aromatic hydrocarbons, an excellent quantitative correlation was seen between the capacities of these compounds to cause in vitro transformation (formation of multilayered colonies, which formed fibrosarcomas after inoc. into unconditioned adult C3H mice), and their skin tumor-initiating activities in the 2-stage mouse skin bioassay. The most active compounds in the in vitro test were 4-fluoro-10-methyl-1,2-benzanthracene, 3,4-benzpyrene, 7,12-dimethylbenzanthracene and 3-methylcholanthrene (in decreasing order of activity); 1,2,5,6-dibenzanthracene was moderately active. Control cultures (exposed to the dimethylsulfoxide vehicle only), and cultures exposed to 2 hydrocarbons without skin tumor-initiating activity (1,2,3,4-dibenzanthracene and 3-fluoro-10-methyl-1,2-benzanthracene), showed no transformation.

69-2812 EXPERIMENTAL STUDIES ON FIBRINOLYSIS IN GROWTH AND SPREAD OF TUMOUR. (E.) Peterson, H.-I. (U. Goteborg, Sweden). Acta Chir. Scand. Supp. 394:1-42, 1968.

A transplantable spontaneous mammary carcinoma and a transplantable 3-methylcholanthrene (MC; 1 mg s.c.)-induced sarcoma from C3H mice demonstrated high and low thromboplastic activity, resp., and low and high fibrinolytic activity, resp. The growth rates of both tumors were increased by admin. of streptokinase-activated human plasminogen. Tranexamic acid (an antifibrinolytic agent) reduced the growth of the mammary carcinoma, but did not affect the MC-induced sarcoma. Induced antifibrinolysis caused a decrease in tumor cell shedding; induced fibrinolysis increased tumor cell shedding in the mammary tumor, but not in the sarcoma. Tranexamic acid stimulated the growth rate of lung metastases; this effect seemed to be related to its immunosuppressive action, rather than to its antifibrinolytic action.

69-2813 MUTAGENIC ALKYLATING AGENTS AS GROWTH INHIBITORS AND CARCINOGENS. (E.) Koller, P. C. (Roy. Cancer Hosp., London). Mutat. Res. 8(1):199-206, 1969.

In rats and mice, s.c. tumors (usually sarcomas) developed after 20 wk. of s.c. admin. of 3/3 alkanesulfonates and 4/4 aromatic nitrogen mustard-type alkylating agents (1 inj./wk.; 2 mg/kg/dose in rats, 1 mg/kg/dose in mice). The alkanesulfonates induced tumors in 17/30 rats and 4/30 mice; the nitrogen mustards induced tumors in 28/48 rats and 7/48 mice. The most powerful carcinogen was N,N-di-2-chloroethyl-β-naphthylamine, which induced tumors in 12/12 rats and 2/12 mice. The primary tumors (at the inj. site) showed a variety of mitotic abnormalities, which varied greatly among different tumors induced by the same alkylating agent; these mitotic abnormalities were believed to be secondary products of tumor growth (probably caused by the unfavorable environment prevailing in the disorganized tumor tissue). The experimental antitumor effects of alkylating agents of these types (5 nitrogen mustards, 3 alkanesulfonates), however, apparently resulted from injuries to the mitotic apparatus, especially the chromosomes.

69-2814 EFFECT OF LONG-TERM TREATMENT WITH NORETHYNODREL ON A/J AND C_3H/HeJ MICE. (E.) Kahn, R. H. (U. Michigan Med. Sch., Ann Arbor) and B. L. Baker. Endocrinology 84(3): 661-668, 1969.

Virgin female A/J and C3H/HeJ mice were treated with norethynodrel (N; 2 inj./wk. of 125 µg/20 g body wt., s.c.) and followed up for 106 and 88 wk., resp. Histological examination of mammary glands from both treated strains revealed some lobulo-alveolar development with hyperplastic alveolar nodules. These changes were absent in untreated controls. Type B mammary adenocarcinomas developed in 8/50 treated A/J mice and in 28/50 C3H/HeJ mice (compared to 0 and 12/50, resp., in untreated controls). Ovaries of N-treated mice increased in wt. and many showed epithelium-lined tubules. The uteri demonstrated cystic glandular development, associated with endometrial connective tissue hyalinization. Cytological changes in the pars distalis of the pituitary were seen in C3H/HeJ mice, but were virtually absent in A/J mice; 6/50 treated A/J mice developed carcinoma of the cervix.

69-2815 RELATIONSHIP OF CARCINOGENESIS AND EPIDERMIZATION DURING 20-METHYLCHOLANTHRENE TREATMENT OF THE MOUSE UTERINE CERVIX. (E.) Graham, C. E. (Emory U., Atlanta, Ga.). Amer. J. Obstet. Gynec. 103(8):1084-1092, 1969.

In 6-wk.-old virgin female C3H/HeJ mice, implantation of threads impregnated with beeswax (controls) or beeswax + 3-methylcholanthrene (MC) into tne cervix, induced epidermization of the cervical canal after 2 and 4 wk. Invasive carcinomas did not develop in any control animals or those treated for 2 wk. with MC, but developed in 7/15 mice treated with MC for 4 wk. It was concluded that epidermization is not necessarily an integral effect of the carcinogen (since it was seen in control animals), although most squamous cell carcinomas arose from areas of epidermization or adjacent areas of columnar cells (as opposed to the original stratified epithelium). The tumor epithelium was apparently closely associated with the myometrial tissue, since tumor cells lined the thread's exit route (where the thread passed through the uterine wall), suggesting that the development of these tumors was related to a disturbance of normal epithelial-mesenchymal relationships.

69-2816 ULTRASTRUCTURE OF EXPERIMENTAL NERVE TUMORS. (Ger.) Georgsson, G. (U. Bonn, Germany), W. Wessel and C. Thomas. Z. Krebsforsch. 72(1):12-23, 1969.

In groups of 3-4-mo.-old Wistar II (BR 46) rats, p.o. admin. of N-nitroso-N-methylurea (4 mg/kg/day, 5 doses/wk., total 479-565 mg/kg; or 40 mg/kg/day for 4 days) induced malignant anaplastic tumors (closely resembling human schwannomas or neurinomas) of the nerves and spinal cord, cauda equina, lumbosacral and brachial plexus. All neurinomas arose from the white substance of Schwann. In 4/6 tumors examined ultrastructurally, the vol. of the granular endoplasmic reticulum ranged from 32.42-39.24 g%, and the vol. of the mitochondria was 1.13-2.80 g%. The other 2/6 tumors, which were relatively poorly differentiated, showed lower values for the vol. of the granular endoplasmic reticulum (12.94 or 20.18 g%) and the mitochondria (3.21 and 0.91 g%, resp.).

69-2817 PRENEOPLASTIC CHANGES IN THE CENTRAL NERVOUS SYSTEM OF MICE INDUCED BY METHYLCHOLANTHRENE. (E.) Kroh, H. (Exp. Clin. Med. Res. Ctr., Polish Acad. Sci., Warsaw). Neuropat. Pol. 7(1-2):55-72, 1969.

In 8-wk.-old RIII and male C3H/A mice with intracerebrally implanted crystalline 3-methylcholanthrene (MC) pellets (1 pellet/mouse), morphological and histoenzymatic studies were performed in the 106/170 animals that did not develop cerebral or intracranial tumors (seen in 13/170) or other severe diseases (including leukemia or mammary cancer). Almost all animals showed a thin single layer of elongated mesenchymal cells parallel to the MC pellet. Endothelial edema in the adjacent capillary vessels was more marked in MC-treated brains than in controls (receiving graphite pellets). The MC-treated animals showed more extensive glial reactions than controls. Alkaline phosphatase activity in the adjacent capillary endothelium and in the surrounding white matter was reduced; this was attributed to MC-induced endothelial damage, which disturbed the blood-brain barrier. A direct relationship was postulated between the alkaline phosphatase disturbance in the capillary endothelium and the presence of MC in the cerebral tissue. The cells surrounding the MC pellets also showed increased acid phosphatase and aminopeptidase activities, apparently representing a non-specific reaction to MC.

See also abstract nos.: 2730,2731,2732,2733,2734,2735,2736,2737,2738,2739,2742,2755,2768,2854,2859, 2926,2927,2932,2937

69-2818 NEW DATA IN THE STUDY OF KERATOACANTHOMA. (Sp.) Gay Prieto, J. (Cent. U., Madrid), G. González and P. Garcia Gancedo. Med. Cutanea 3(4):353-365, 1969.

Two types of virus-like particles were seen in cells from 4 human keratoacanthomas: intranuclear, highly osmiophilic particles (about 7000 Å in diameter), in a perinucleolar distribution pattern and sometimes surrounded by a double membrane; and smaller particles (about 2500 Å) underneath the cell membrane, surrounded by a single membrane. Many vacuoles were noted in the mitochondria and Golgi apparatus. These tumors were serially transplantable into the chick embryo chorioallantoic membrane. Serial electron microscopic examination of the chorioallantoic membrane tumors showed that the development of intranuclear inclusions (apparently resulting from accumulation of nucleolar RNA) was preceded by the development of highly osmiophilic cytoplasmic inclusions (apparently containing RNA), which were seen at the same time as the accumulation of large, lipid-containing phagosomes. The mitochondria and Golgi apparatus were well-developed.

69-2819 MORPHOLOGICAL CHARACTERISTICS OF A PRIMARY CULTURE OF MOUSE CELLS, AND OF NORMAL AND VIRUS-BEARING CELL LINES CAPABLE OF INDUCING TUMORS. (It.) Violante, A., A. Poletti and M. Marchegiani. Ann. Ist. Sup. Sanit. 4(3-4):254-260, 1968.

Two non-neoplastic cell lines of mouse embryonic origin (1 was derived from the other), and 1 neoplastic line of cells from a 1:2,5:6-dibenzanthracene-induced hamster myofibrosarcoma, showed no virus-like particles (VLP). Examination of 8 other neoplastic cell lines of mouse origin, some of which were derived from other cell lines in the group (including 1 cell line carrying NDV [Newcastle disease virus?], 1 carrying polyoma virus, and 3 cultures derived from tumors induced by these 2 cell lines), showed Type I, II or III viral inclusion bodies, together with intra- or extracytoplasmic VLP. The VLP found in the cultures of tumor cells were enclosed by membranes, but the VLP seen in the cell cultures that had induced these tumors showed no membranes. It is suggested that the presence of a virus may facilitate neoplastic transformation in vitro of cell lines which might otherwise show spontaneous transformation. The role of VLP in the tumor-inducing capacity of such cell lines could not be determined from these data.

69-2820 THE N-TERMINAL AMINO ACID OF AN AVIAN LEUKOSIS GROUP-SPECIFIC ANTIGEN FROM AVIAN MYELOBLASTOSIS VIRUS. (E.) Allen, D. W. (Massachusetts Gen. Hosp., Boston). Virology 38(1):32-41, 1969.

Cellulose acetate electrophoresis was used to isolate an avian leukosis group-specific antigen from avian myeloblastosis virus (AMV) treated with Tween-ether. The antigen and protein migrated together on polyacrylamide gel electrophoresis and on Sephadex G-100 column chromatography. The molecular wt. of the antigen was about 20,000 and the N-terminal residue was proline (1 proline residue/mole of antigen).

69-2821 STUDIES ON THE RNA FROM AVIAN MYELOBLASTOSIS VIRUS. (E.) Erikson, R. L. (U. Colorado Med. Ctr., Denver). Virology 37(1):124-131, 1969.

Two RNA components were isolated from purified avian myeloblastosis virus (AMV); a large, fast component with a sedimentation value of 65S, accounting for 60-70% of the RNA; and a slow 4S component, which appeared to be similar to the host cell transfer RNA (based on the amount of methylation of RNA and the base ratios). The large component was apparently not methylated and behaved like a single-stranded RNA of high molecular wt. After heating of the 65S RNA to above 70°C, the only breakdown product detectable under appropriate conditions was a 35 S component(s) with a molecular wt. of about 2×10^6 (or 20% of the AMV RNA).

69-2822 THE MECHANISM OF RADIATION ACTION IN LEUKEMOGENESIS. III. THYMOLYTIC EFFECT INDUCED BY THE LEUKEMOGENIC AGENT. (E.) Haran-Ghera, N. (Weizmann Inst. Sci., Rehovoth, Israel). Israel J. Med. Sci. 4(6):1169-1180, 1968.

A filterable leukemogenic agent (FLA), obtained from a urethan + irradiation-induced lymphoma of C57BL/6 mice, was inoc. directly into 6- or 30-day-old thymus or spleen homografts (under the kidney capsule) of intact or thymectomized, irradiated (400 r) or non-irradiated C57BL/6 mice. FLA had a specific thymolytic effect, but the only mice in which this effect persisted were those that had been exposed previously to whole-body irradiation, and these were the only animals that developed lymphomas. The other groups of mice, which developed no lymphomas, showed recovery of the thymocytes within 50 days after FLA inoc. FLA did not cause cellular depletion in spleen homografts. The thymolytic effect of FLA on the thymus in situ was also demonstrated in mice treated with thigh-shielded irradiation (400 r), in which the characteristic thymic regeneration pattern was altered by i.v. inoc. of FLA 5 days after the end of irradiation. In these mice, thymus wt. returned to normal within 10 days. It is suggested that the onset of this preleukemic thymic atrophy depended on the amount of virus present in the thymocytes.

69-2823 THE MECHANISM OF RADIATION ACTION IN LEUKEMOGENESIS. IV. IMMUNE IMPAIRMENT AS A COLEUKEMOGENIC FACTOR. (E.) Haran-Ghera, N. (Weizmann Inst. Sci., Rehovoth, Israel) and A. Peled. Israel J. Med. Sci. 4(6):1181-1187, 1968.

A filterable leukemogenic agent (FLA) obtained from irradiated, non-leukemic tissues of C57BL mice, when inoc. directly into 7-day-old thymus homografts (under the kidney capsule) in intact or thymectomized adult C57BL/6 mice, induced lymphatic leukemia in 5-20% of the animals. Exposure to whole-body irradiation (250-400 r) before or after FLA inoc. increased the leukemia incidence to 80-100%. Admin. of rabbit anti-mouse thymocyte serum (ATS; for 7 days), beginning 2 days after FLA inoc., increased the leukemia incidence to 78-100% in non-irradiated animals. Irradiation enhanced FLA leukemogenesis by inducing a transient, cell-mediated immune depression; ATS apparently had a similar effect. Admin. of normal rabbit serum did not enhance FLA leukemogenesis, and the coleukemogenic effects of neonatal thymectomy were slight. The immunosuppressive effects of ATS were demonstrated in another experiment in C57BL mice bearing a strain-specific tumor (a 3,4-benzpyrene-induced fibrosarcoma from C3H/Jax mice); 25/25 ATS-treated mice developed regressing tumors, but no tumor takes were seen in the absence of ATS admin.

69-2824 ON PLASMOCYTOMA - ONCOGENESIS OF MICE. II. DIFFERENTIAL ULTRACENTRIFUGATE WHICH CONTAINS RNA VIRUS-LIKE PARTICLES FROM HIPA TUMOR INDUCING A PLASMOCYTOID NEOPLASIA IN BALB/c MICE. (E.) Pedio, G. (U. Zurich, Switzerland), E. Grieshaber and J. R. Rüttner. Path. Microbiol. (Basel) 32(5):241-253, 1968.

Cell-free preparations were obtained from the ascitic fluid and the solid mesenteric tumors of adult BALB/c mice inoc. with tumor-cell containing ascitic fluid from BALB/c mice bearing the HIPA plasmacytoid tumor (a virus-containing tumor, originally induced by inoc. of cell-free extracts of splenic tissue from BALB/c mice that had failed to develop tumors after mineral oil admin.). The cell-free preparations, prepared by differential centrifugation in sucrose (the Chenaille method), were inoc. i.p. into newborn or weanling mice. Typical HIPA tumors (including abnormal serum protein patterns) developed in 5/6 newborn and 2/6 weanling mice inoc. with the preparation from ascitic fluid (after latent periods of 38-76 days), but no tumors were seen in mice inoc. with the preparation from the mesenteric tumors. Virus-like particles, resembling the RNA viruses of the leukemia-sarcoma group, were seen in the donor tissues and in cell-free preparations from the ascitic and solid tumors.

69-2825 INHERITANCE OF SUSCEPTIBILITY TO FRIEND MOUSE LEUKEMIA VIRUS. (E.) Odaka, T. (U. Tokyo). Acta Path. Jap. 18(3): 353-356, 1968.

Genetic susceptibility to the Friend leukemia virus (FLV) was studied in F_1, F_2 and backcross hybrid mice of 1 resistant strain (C57BL/6) and either of 2 susceptible strains (RF and DDD). The results were consistent with the hypothesis that FLV susceptibility is controlled by a single major dominant gene (incompletely dominant over the gene for FLV resistance), or by a complex of genes closely linked on the same chromosome. No relationship between FLV susceptibility and either sex or hair color was noted.

69-2826 EXTRACTION AND PREPARATION OF TUMOR NEOANTIGENS DERIVED FROM SPLENIC CELLS AND PLASMA OF MICE BEARING CHARLOTTE FRIEND LEUKEMIA. (Fr.) Martyré, M.-C. (Paul-Brousse Hosp., Villejuif, France) and O. Halle-Pannenko. Rev. Franc. Etud. Clin. Biol. 13(10):1010-1012, 1968.

A biologically active water-soluble antigen fraction (H) and a biologically active "interphase" fraction (I) were derived from the spleen cells of adult female DBA2/CBA mice bearing the Friend virus (FLV) leukemia; a soluble antigen (S) was derived from the serum of infected mice of the same strain. Other adult female mice were then immunized by 4 s.c. inj. (over 10 days) of H (3 mg/dose), I (3 mg/dose) or S (1.8 mg/dose) and 2 mo., later, by single i.p. doses of the antigens (4 mg of H or I; 3 mg of S), 10 days before inoc. of FLV (dose and route not stated). All control mice died within 140 days after FLV inoc. The 140-day mortality rates in mice treated with H, I or S were 26/34, 12/32 and 4/19, resp., ranging from 0-63% in 4 experiments using I, 33-100% in 4 experiments using A, and 0-50% in 3 experiments using S. Further studies are required to determine whether the protection was conferred by the tumor antigen(s), or by particles derived from the virus during the preparation of the inocula. Two methods for preparing the spleen fractions employed are described.

69-2827 IN VITRO STUDIES ON MURINE VIRAL LEUKEMIA CELLS. ROLE OF VIRUS IN NEOPLASTIC GROWTH OF CELLS. (E.) Oboshi, S. (Nat. Cancer Ctr. Res. Inst., Tokyo). Acta Path. Jap. 18(3):380-393, 1968.

In 199 clones obtained from a cell line cultured from an ascites tumor, originating in the leukemic spleen of a Friend leukemia virus (FLV)-infected mouse, FLV production was not necessarily stable. The clones easily changed into mixed populations of cells of various infectivity, but the low- and high-FLV titer clones showed identical in vitro growth, in vivo transplantability and cell morphology. It is suggested that persistent infection by active FLV may not be responsible for the neoplastic growth of the cells.

69-2828 EXPERIMENTAL STUDIES ON PREVENTION OF RAUSCHER LEUKEMIA BY RAUSCHER VIRUS VACCINE: AN ELECTRON MICROSCOPIC OBSERVATION OF VIRUS PARTICLES IN THE SPLEEN. (Jap.) Nagao, T. (Okayama U. Sch. Med., Japan), Y. Suga, K. Kitajima and K. Hiraki. Igaku to Seibutsugaku (Med. Biol. [Tokyo]) 78(2):59-62, 1969.

Admin. of a Rauscher leukemia virus (RLV) vaccine, prepared with Freund's adjuvant, prevented the development of RLV-induced leukemia in 80% of a group of treated mice. Electron microscopic examination of the spleens of mice that did not develop leukemia showed no mature virus particles, although some immature Type C particles were seen in the cells. In the mice developing leukemia despite vaccine admin., some intracellular Type A (mature) RLV particles were seen in the spleen cells, but their numbers were reduced (by comparison to the virus particle counts seen in controls not admin. the vaccine) because of the presence of neutralizing antibody.

69-2829 INDUCTION OF LEUKEMIA IN MICE BY MEANS OF PHENOL EXTRACT FROM MOLONEY VIRUS-INDUCED LEUKEMIA. (E.) Tsubura, Y. (Nara Med. U., Japan), I. Kimura, T. Inoue and Y. Hashimoto. Nara Igaku Zasshi (J. Nara Med. Ass.) 20(1): 13-20, 1969.

RNA or DNA extracts were prepared (by the Gierer-Schramm and Kirby methods, resp.) from Moloney leukemia virus (MLV)-induced leukemic tissues of DD mice, and inoc. into newborn DD, A and (C57 x DD) BC_2 mice. The DNA extracts induced no tumors in DD mice. Of 33 mice surviving more than 8 wk. (the latent period for leukemia induction by MLV) after inoc. of RNA extracts, 2/10 females of the (C57 x DD)BC_2 strain developed leukemia after latent periods of 150 or 193 days. One female of strain A and 4 of strain DD developed spontaneous mammary tumors, but these were attributed to the milk agent rather than to the extract. Leukemia induction by infectious RNA could not be deduced from these results, since the RNA extracts were not prepared from the virus itself, but from MLV-induced leukemic tissue, which contains additional cellular components.

69-2830 ENTEROVIRUSES OBSERVED BY THE ELECTRON MICROSCOPE IN BIOPSIES OF MALIGNANT CANINE TUMORS. (Fr.) Seman, G. (Paul-Brousse Hosp., Villejuif, France), J. C. Guillon, M. Proenca and A.-M. Méry. Rev. Franc. Etud. Clin. Biol. 13(10):1006-1009, 1968.

When ultrathin sections of biopsy specimens from 8 spontaneous mammary tumors and 6 spontaneous lymphosarcomas from dogs were examined under the electron microscope, particles resembling Type C mouse leukemia virus particles were found in 4/6 lymphosarcomas. Specimens of the other 2 lymphosarcomas and 2/8 mammary tumors showed virus-like particles (measuring approx. 25 mμ), grouped in pseudocrystalline systems, in the cytoplasmic matrix and in endoplasmic cavities, but never in the nucleus. The pseudocrystalline formations varied considerably in length and in the number of particles involved, each of which appeared to be in contact with 4 of its neighbors, by means of short, orthogonous bridges. A comparison of these particles with enteroviruses grown in vitro (which showed well-defined morphological characteristics) showed that they closely resembled the "complete" particles of both foot-and-mouth disease virus and poliovirus.

69-2831 PROPERTIES OF CLONAL LINES OF MURINE SARCOMA VIRUS TRANSFORMED Balb/3T3 CELLS. (E.) Todaro, G. J. (NCI, Bethesda, Md.) and S. A. Aaronson. Virology 38(1):174-179, 1969.

A clone of Balb/3T3 cells, susceptible to focus formation by mouse sarcoma virus pseudotypes that can grow in Balb/c cells, underwent transformation after exposure to either tumor extracts of a Balb/c leukemia virus pseudotype of mouse sarcoma virus, or to the supernatant fluids from Balb/3T3 cultures transformed with this virus preparation. The transformed foci showed refractile and fusiform cells growing over the adjacent normal cells. After the first 1 wk., most foci either progressed no further or regressed. The transformed colonies enlarged by cell division (as shown by incorporation of ^{3}H-thymidine). Cells from the area of transformed colonies, when transferred in high dilution, gave rise to clones of 2 morphological types: 1/2 was not easily distinguishable from non-transformed Balb/3T3 cells; the other was composed of round or fusiform, highly refractile cells that adhered poorly to the substrate. Transformed clones derived from single cells grew well and released mouse sarcoma virus. Focus-forming activity of the virus released followed "one-hit" kinetics. At least one clone "spontaneously" yielded colonies of typical Balb/3T3 morphology. The transformed clones induced tumors in 4/5 weanling Balb/c mice. The use of this continuous line of non-tumorigenic Balb/3T3 cells with high cloning efficiency, made it possible to isolate lines starting from single transformed cells, each of which resulted from an independent virus-cell interaction.

69-2832 MORPHOLOGICAL CELLULAR CONVERSION AND VIRAL REPLICATION AFTER IN VITRO INFECTION OF HUMAN CELLS BY MOLONEY STRAIN MOUSE

SARCOMA VIRUS. (Fr.) Bernard, C. (St. Louis Hosp., Paris), J. Lasneret, M. Boucher and M. Boiron. C.R. Acad. Sci. [D] (Paris) 268(3):624-627, 1969.

In 2 human embryonic cell lines infected *in vitro* with Moloney mouse sarcoma virus (MSV), morphological conversion of the cells and MSV replication took place under some conditions. On the other hand, the Moloney leukemia virus (present in the MSV stock) consistently replicated in these human cell cultures.

69-2833 NEW FINDINGS CONCERNING THE VIRAL ETIOLOGY OF THE SO-CALLED YOSHIDA ASCITES SARCOMA. (It.) Gimbo, A. (U. Messina, Italy) and G. Costanzo. Arch. Ital. Pat. Clin. Tumori 11(3-4):311-325, 1968.

Acellular ascites fluid, obtained from Wistar rats bearing ascitic Yoshida sarcoma (YS), was prepared by several ultracentrifugation methods; the resulting cell-free supernatants or sediments were inoc. i.p. into 7 groups of newborn and adult Wistar rats. Of the evaluable rats (surviving until the time that 1 rat in each group showed signs of disease), 11/69 (4/49 newborn, 7/20 adult rats) developed no tumors; 7/69 (5/49 and 2/20, resp.) developed regressing tumors; 9/69 (6/49 and 3/20, resp.) developed acellular ascites which did not induce tumors when inoc. into other rats, and the other 42/69 (34/49 newborn and 8/20 adult rats) developed typical ascitic and/or solid YS, which did not regress. Since supernatant fluids from preparations centrifuged at up to 105,000 x g for 2 hr. induced typical non-regressing YS, it is concluded that the YS is a viral tumor.

69-2834 STRUCTURAL PROTEINS OF ROUS SARCOMA VIRUS (SCHMIDT-RUPPIN STRAIN). ELECTROPHORETIC STUDY ON POLYACRYLAMIDE GEL. (Fr.) Rabotti, G. F. (Coll. France, Paris). C.R. Acad. Sci. [D] (Paris) 268(2):456-458, 1969.

Electrophoretic analysis (on polyacrylamide gel) of purified Rous sarcoma virus (Schmidt-Ruppin strain) disclosed 6 electrophoretic bands, corresponding to 6 proteins of different molecular wt. The relationship between these proteins and the group-specific antigens was not determined.

69-2835 CELL DIFFERENTIATION AND VIRAL SUSCEPTIBILITY. (E.) Hay, R. J. (Carnegie Inst., Pittsburgh, Pa.), M. Yoshikawa-Fukada, S. Yuyama and J. D. Ebert. Carnegie Institution Jan.:429-440, 1969.

Hybridization was observed between RNA from Rous sarcoma virus (RSV) and DNA from either non-infected chick embryo fibroblasts or DNA from RSV-infected cultures of chick embryo skeletal muscle cells. The hybridized RNA represented only part of the RSV-RNA molecule, probably the part bound most firmly to host DNA. An almost identical hybridization pattern was observed between RSV RNA and DNA from HeLa (human cancer), calf thymus, L, BHK21 (hamster), clone 2 (transformed hamster), and hamster liver cells, but not DNA from bacteria (*Escherichia coli* or *Micrococcus lysodeikticus*). Methods are described for culturing sensory nerve cells, hepatocytes, chorioallantoic membrane cells and HeLa cell-RBC heterokaryons, for future studies of the effects of RSV on different cell types at various stages of growth and development.

69-2836 STRUCTURAL PROPERTIES OF ADENOVIRUS DNA'S. (E.) Van Der Eb, A. J. (U. Leiden, Netherlands) L. W. Van Kesteren and E. F. J. Van Bruggen. Biochim. Biophys. Acta 182(2):530-541, 1969.

The linear, double-helical DNA of adenovirus types 5, 12 and 18 was denatured readily in alkaline soln. to form single-stranded DNA. The DNA was highly resistant to strand separation after denaturation in 12% formaldehyde at 80°C; this was attributed to formaldehyde-induced formation of cross-links in regions rich in guanine-cytosine sequences. Electron microscopic examination showed that DNA liberated from purified adenovirus type 5 particles by treatment with alkali (pH 10.5 or 11.0) or 0.17% sodium dodecyl sulfate occurred as compact, reticular structures; this was attributed to association of the DNA with a protein. The molecular wts. of oncogenic types 12 and 18 were slightly lower than that of the nononcogenic type 5 (23.4-24.9 x 10^6).

69-2837 GENETIC STUDIES WITH TUMORIGENIC ADENOVIRUSES. II. HETEROGENEITY OF *cyt* MUTANTS OF ADENOVIRUS TYPE 12. (E.) Takemori, N. (California State Dept. Pub. Health, Berkeley), J. L. Riggs and C. D. Aldrich. Virology 38(1):8-15, 1969.

The cytocidal, large-plaque-forming, low-tumorigenic *cyt* mutants of the Huie and 1131 strains of adenovirus type 12 (AV-12) were heterogenous; 12% and 57%, resp., showed the *kb* phenotype. The *cyt kb* mutants produced a max. CPE, but failed to propagate on non-permissive KB-1 cells; both the parental AV-12 strains and the *cyt kb+* mutants multiplied readily in KB-1 cells, producing an adenovirus-type CPE and a cytocidal CPE, resp. The *cyt kb* mutants produced T antigen almost as well as the parental viruses and the *cyt kb+* mutants, but production of hexon antigen was negligible at 48 hr. (compared with the other strains). Both mutants propagated readily in KB-2 (kb permissive) cells. Some of the spontaneous *cyt kb* mutants reverted to the *cyt+ kb+* type (forming small, fuzzy-edged plaques), which were as tumorigenic in newborn hamsters as the parental strains. It is suggested that cyt kb is a nonsense mutation.

69-2838 IMMUNOLOGICAL AND MORPHOLOGICAL STUDIES ON HUMAN ADENOVIRUS TYPE 31. (E.) Ahmad-Zadeh, C. (Inst. Hyg., U. Geneva, Switzerland), M. Herzberg, M. F. Paccaud and R. H. Regamey. Path. Microbiol. (Basel) 32(5):254-266, 1968.

Results of immunodiffusion studies (using rabbit antisera) of the 3 soluble antigens of adenovirus type 31 (AV-31) suggested that the H component corresponds to the hexon antigen (nonvertex capsomers), the F component to the fiber antigen, and the Pb component to the base of the penton antigen (vertex capsomers). The fibers of AV-31 showed both type and subgroup specificity, as did the F antigen. The AV-31 capsid was structurally similar to the capsids of the non-oncogenic adenoviruses, but the fibers seen in these AV-31 preparations were much longer (300 Å) than those described for other adenovirus types. The H antigen component of AV-31 (which contains the major group-specific complement-fixing antigen) was group- and subgroup-specific; subgroup specificity was shared with adenovirus type 12 at least. The Pb component showed type and possibly subgroup specificity.

69-2839 REPLICATION OF HUMAN ADENOVIRUS IN GREEN MONKEY KIDNEY CELLS TRANSFORMED BY ADENO 7-SV40 HYBRID VIRUS. (E.) Shiroki, K. (Nat. Inst. Health, Tokyo) and H. Shimojo. Jap. J. Microbiol. 13(1):125-128, 1969.

The hy-tr GMK line of green monkey kidney (GMK) cells, transformed by UV-irradiated hybrid adenovirus type 7-SV40 (LL strain SP2), permitted the replication of SV40 and human adenoviruses types 2, 3, 7 and 12. SV40 also replicated in GMK cells, but the adenoviruses did not. It is suggested that the presence of the T antigen or the genome (perhaps only part of the genome) of SV40 may have supported adenovirus replication in hy-tr GMK cells, without the replication of SV40 or PARA (defective particles carrying the SV40 genome).

69-2840 TRANSFORMATION OF HAMSTER EMBRYO FIBROBLASTS BY SV 40-ADENO 7 HYBRID VIRUS AND THE PROPERTIES OF THE TRANSFORMED CELLS. (E.) Vonka, V. (Res. Inst. Immunol., Prague), L. Kutinová, H. Závadová and D. Rezáčová. Arch. Ges. Virusforsch. 26(4):377-388, 1969.

In hamster embryonic fibroblasts transformed by adenovirus type 7-SV40 hybrid virus (LL strain SP2), no infectious virus was detected, although complement fixation and immunofluorescence tests demonstrated the SV40 tumor (T) antigen. The transformed cells were able to induce tumors in young adult Syrian hamsters within 1 mo. of s.c. inoc. Sera from the tumor-bearing hamsters showed antibodies that reacted with the SV40 T antigen, but not with the viral (V) antigens of either SV40 or adenovirus type 7.

69-2841 MOLECULAR BIOLOGY OF CARCINOGENESIS. I. STUDIES ABOUT THE COMPLEMENTARITY OF CELL NUCLEIC ACIDS. (E.) Valladares, Y. (Ciudad U., Madrid) and Y. Alvarez. Med. Exp. (Basel) 18(4-6):255-270, 1968.

DNA-DNA and DNA-messenger RNA (mRNA) hybridization was studied by several methods, using labeled nucleic acids from the AV3/INO clone of human amnion cells. In 1 experiment, no complementarity was seen between salmon sperm DNA and AV3/INO DNA (1 part salmon sperm DNA paired with 833,333 parts of AV3/INO DNA). Results of several hybridization experiments, using nucleic acids from AV3/INO cells, suggested that only 1 of the strands of duplex DNA gives information for cellular mRNA biosynthesis, leaving an entire strand of the duplex DNA (or at least a 45.5% fraction of it) free for some other purposes.

69-2842 MOLECULAR BIOLOGY OF CARCINOGENESIS. II. COMPLEMENTARITY BETWEEN CELL AND VIRUS NUCLEIC ACIDS IN VIRAL CARCINOGENESIS. (E.) Valladares, Y. (Ciudad U., Madrid), Y. Alvarez, E. Tabarés and T. Pintado. Med. Exp. (Basel) 18(4-6):271-282, 1968.

Viral and cellular DNA complementarity was studied by hybridization experiments using several normal, transformed and tumor cell lines. The virus investigated was "cancervirus" (CV), a papovavirus obtained from the DNA of a human lung tumor, grown in HeLa cells and later adapted to primary mouse embryo cell cultures. Preliminary studies suggested that a degree of complementarity (DC) of 2 ppm (as seen in DNA-DNA hybrids using DNA from CV and from normal human amnion cells) was equivalent to a single gene, when single-stranded DNA from duplex DNA was paired; a DC of 1 ppm was equivalent to 1 informational cistron, when single-stranded RNA was paired. The results suggested that DNA from mouse cell-adapted CV had 4 genes in common with DNA from susceptible, non-infected cells (normal mouse liver and spleen), 12 genes in common with DNA from CV-transformed mouse cells (a CV-induced mouse tumor), 1 gene in common with normal hamster DNA (liver and spleen cells), and 5 genes in common with DNA from an SV40-induced hamster tumor. Therefore, CV-induced transformation involved 8 additional genes, and DNA preparations from the CV-induced mouse tumor and the SV40-induced hamster tumor studied had 4 identical genes.

69-2843 MOLECULAR BIOLOGY OF CARCINOGENESIS. III. RELATIONS BETWEEN THE TWO STRANDS OF THE DNA, THE NORMAL CELL mRNA and THE mRNA FROM VIRUS-TRANSFORMED CELLS, PROVING THE EXISTENCE OF A GENETIC STRAND (gDNA) AND AN INFORMATIONAL STRAND (iDNA) IN DUPLEX DNA. (E.) Valladares, Y. (Ciudad U., Madrid), Y. Alvarez, E. Tabarés and T. Pintado. Med. Exp. (Basel) 18(4-6):283-298, 1968.

Relationships between DNA and messenger RNA (mRNA) were studied in preparations from normal mouse (embryonic) or human (amnion) cells, cells from SV40-induced mouse or hamster tumors, DNA from the papovavirus designated "cancervirus" (CV; see the preceding abstract), and cells from CV-induced mouse or hamster tumors. The results of hybridization experiments showed that the 89% of the single-stranded DNA which shows complementarity, consists of equal parts of the informational DNA strand (iDNA; associated with 44.5% of the DNA and all of the mRNA) and the genetic DNA strand (gDNA). The 11% of the DNA not showing complementarity is the singular DNA strand (sDNA), associated 9% to soluble RNA, 0.6% to ribosomal RNA, and 1.4% to an unknown component. Cancer cells showed some information of cellular cistrons not found in normal cells, and lacked other information present in normal cells. The DNA viruses (SV40 and CV) were apparently linked by lysogenicity or transcription to gDNA, and induced the formation of the corresponding phenotypic mRNA by base pairing with the iDNA strand. It is suggested that viruses consist of infective DNA or mRNA molecules, arising from cellular cistrons of gDNA and from informative mRNA molecules on the iGNA template. The tumor viruses may have a universal genetic code determining their oncogenicity, together with other codes determining their phenotypic effects.

69-2844 IMMUNOLOGICAL RELATIONSHIPS OF SOME ONCOGENIC DNA VIRUSES. I. TRANSPLANTATION IMMUNITY STUDIES. (E.) Potter, C. W. (U. Sheffield, Yorkshire, England), J. M. Hoskins and J. S. Oxford. Arch. Ges. Virusforsch. 27(1):73-86, 1969.

Tumor enhancement was observed in hamsters immunized with various normal cell extracts before transplantation of SV40-induced tumor cells. Transplantation immunity against SV40-induced tumor cells was found in hamsters immunized with SV40 virus, but not in animals immunized with human adenoviruses (types 5, 12 and 31), an avian adenovirus (chick embryo lethal orphan; CELO) or human wart virus.

69-2845 IMMUNOLOGICAL RELATIONSHIPS OF SOME ONCOGENIC DNA VIRUSES. II. PRIMARY TUMOUR INHIBITION STUDIES. (E.) Potter, C. W. (U. Sheffield, Yorkshire, England), J. S. Oxford and J. M. Hoskins. Arch. Ges. Virusforsch. 27(1):87-93, 1969.

Newborn hamsters were immunized with homologous and heterologous viruses during the tumor latent period after inoc. of SV40 virus. After a single dose of SV40, 50% of the animals developed tumors; immunization with additional doses of SV40 reduced the tumor incidence to 4.8%. The tumor incidence was not significantly decreased after immunization with 2 human adenoviruses (types 12 or 31) or human wart virus, but the tumor incidence was reduced to 5.6% after immunization with an avian adenovirus (chick embryo lethal orphan; CELO).

69-2846 COMPLEMENTATION AND TRANSFORMATION BY TEMPERATURE-SENSITIVE MUTANTS OF POLYOMA VIRUS. (E.) Eckhart, W. (Salk Inst. Biol. Studies, San Diego, Calif.). Virology 38(1):120-125, 1969.

Six temperature-sensitive mutants of polyoma virus (PV) were isolated and grouped into 3 classes, on the basis of complementation and transformation at the non-permissive temperature (38.5° C) in secondary mouse embryo cell monolayers. Class I mutants (2 were isolated) synthesized infectious viral DNA but not mature PV particles, and showed normal transformation (in BHK cells). The 3 Class II mutants were defective in both infectious viral DNA synthesis and in transforming ability. The single mutant of Class III transformed normally, but was defective in the synthesis of infectious viral DNA.

69-2847 TEMPERATURE-SENSITIVE MUTANTS OF POLYOMA VIRUS. (E.) Di Mayorca, G. (Int. Lab. Genet. Biophys., Naples, Italy), J. Callender, G. Marin and R. Giordano. Virology 38(1):126-133, 1969.

Of 150 temperature-sensitive polyoma virus mutants isolated and purified, 95% were stable and maintained their characteristics through several passages; for 33% of the mutants, however, the yield at the permissive temperature (30° C) was only 10^1-10^2 times greater than that at the non-permissive temperature (38.5° C). Over 50% of the mutants showed no complementation at all, while the rest belonged to 4 complementation groups (genes). The first group corresponded to a gene involved in viral DNA synthesis (mutants of this group showed temperature-sensitive transforming ability); the second and third groups corresponded to genes coding for viral proteins. The function of the fourth group (only 1 mutant belonging to this group is listed) has not been determined.

69-2848 PROTECTIVE EFFECTS OF ULTRAVIOLET-IRRADIATED POLYOMA VIRUS COMPARED TO A POLYOMA TUMOR GRAFT. (Fr.) Meyer, G. (Reg. Ctr. Anti-Cancer League, Marseille, France), A. M. Lherisson and J. Fondarai. C. R. Soc. Biol. (Paris) 162(8-9):1535-1538, 1969.

Hamsters were inoc. with 10^6 PFU of non-irradiated polyoma virus (PV; Toronto or CT54 strain) at 1 mo. prior to challenge by 10-2000 times the number of PV-induced tumor cells required to induce tumors in 50% of non-immunized animals (10-2000 x TD_{50}). Protection was afforded against tumor cell challenge doses of the order of 100 x TD_{50}. In hamsters inoc. with the same quantities of UV-irradiated PV and similarly challenged, the degree of protection decreased progressively with increasing doses of UV irradiation of the immunizing inoculum. Although the number of animals involved in the study was too small to permit statistical evaluation of the results in terms of tumor takes, semi-logarithmic projection of the theoretical mean latent periods seen at each UV dose level showed a clearly exponential decrease of protection.

69-2849 TRANSPORT OF AMINO ACIDS BY CONFLUENT AND NONCONFLUENT 3T3 AND POLYOMA VIRUS-TRANSFORMED 3T3 CELLS GROWING ON GLASS COVER SLIPS. (E.) Foster, D. O. (Princeton U., N. J.) and A. B. Pardee. *J. Biol. Chem.* 244(10):2675-2681, 1969.

Confluent 3T3 cells accumulated the non-metabolizable amino acids α-aminoisobutyric acid (AIBA) and cycloleucine (CL) about 30% less quickly than non-confluent 3T3 cells; no differences in rates of accumulation between the 2 types of cultures were observed for glutamine, glutamic acid or arginine. No differences in the rates of accumulation of any amino acids studied were seen between confluent and non-confluent cultures after polyoma virus (PV) transformation. The non-transformed, non-confluent 3T3 cells accumulated AIBA, CL and glutamine about half as rapidly as did the PV-transformed cells, but no differences were observed with glutamic acid and arginine. These results did not support the hypothesis that general alterations in membrane permeability and transport are related to growth regulation.

69-2850 DIMETHYL SULFOXIDE ENHANCEMENT OF TRANSFORMATION BY POLYOMA VIRUS. (E.) Kisch, A. L. (U. New Mexico Sch. Med., Albuquerque). *Virology* 37(1):32-41, 1969.

Addition of low conc. of dimethyl sulfoxide (DMSO, up to 1%) to cultures of polyoma virus (PV)-infected BHK21 hamster fibroblasts in fluid medium up to 5 days after infection, significantly enhanced PV-induced transformation. The transformation frequency increased as a function of DMSO conc. An increase of both "pure" (P) and "mixed" (M) transformed colonies was noted. Since DMSO enhanced transformation long after viral absorption and penetration had occurred, and after cytoplasmic virus particles had disappeared, it is concluded that DMSO affected a later virus-cell interaction, and that enhancement of transformation did not result from increased viral absorption, differential selective pressures, penetration or the carcinogenicity of DMSO itself. It is suggested that DMSO may act on "nascent" transformed cells by causing "physiologically unstable" infected cells to undergo delayed transformation, giving rise to either P or M type colonies. DMSO did not enhance transformation when PV-infected cells were plated in 0.3% agar medium.

69-2851 HISTOCHEMICAL STUDIES OF EXPERIMENTALLY PRODUCED BOVINE FIBROPAPILLOMAS. (E.) Lee, K. P. (U. Wisconsin, Madison) and C. Olson. *J. Invest. Derm.* 52(5):454-464, 1969.

Suspensions of bovine cutaneous fibropapilloma tissues containing bovine papilloma virus (BPV) were admin. repeatedly by intradermal inj. to several newborn calves; tumor histology and histochemistry were observed for up to 60 wk. from the first inj. of BPV suspension. An inflammatory reaction was seen on days 1-7 (after the initial inj.), fibroplasia at 1-4 wk., acanthosis at 4-10 wk., papillomatosis at 10-35 wk., and regression at 25-60 wk. Intranuclear inclusion bodies of BPV particles were seen in the papillomatosis stage. During the acanthotic stage, activities of the oxidative enzymes (reduced di- and triphosphopyridine nucleotide diaphorases, cytochrome oxidase, succinic dehydrogenase and esterase) were intense in the hyperplastic epithelial cells. These enzyme activities decreased progressively towards the keratinized layer as fibroblast maturation took place (during the papillomatosis and regression stages).

69-2852 AGE DISTRIBUTION OF ANTIBODIES TO EB VIRUS IN SWEDISH FEMALES AS STUDIED BY INDIRECT IMMUNOFLUORESCENCE ON BURKITT CELLS. (E.) Demissie, A. (Cent. Bacteriol. Lab., Stockholm) and A. Svedmyr. *Acta Path. Microbiol. Scand.* 75(3):457-465, 1969.

The distribution of antibodies to the Epstein-Barr virus (EBV) was studied in 307 serum specimens obtained from female subjects of 1 Swedish town (Eskilstuna); control sera were obtained from a few African pts. with Burkitt's lymphoma (BL) or glandular fever, and from 1 pt. with embryonic sarcoma (Lemeck-Wilson). EBV antibody titers were determined by indirect or direct immunofluorescence, using 2 BL cell lines (Silfere and Esther) and 2 acute leukemia cell lines (SKL 1 and SKL 2). The results of indirect immunofluorescence tests were highly reproducible. Titers of EBV antibodies in the Swedish subjects varied widely in all age groups; most positive sera were much less reactive than serum from 1 pt. with BL, but the highly reactive sera completely blocked direct staining with a conjugated serum preparation from a pt. with BL. The incidence of EBV antibodies in the Swedish subjects decreased from about 90% at birth (this was attributed to maternal antibodies) to 12% at age 2 yr., then rose steeply to 90% at age 20 yr. EBV antibodies were acquired somewhat earlier than antibodies to rubella virus.

69-2853 SOME BIOLOGICAL PROPERTIES OF A VIRUS ISOLATED FROM A HARE TUMOUR. (E.) Gatti, P. (U. Parma, Italy), K. Brennan and D. Balducci. Ann. Ist. Sup. Sanit. 4(3-4): 336-337, 1968.

A cytopathogenic virus, isolated from the ear and kidney tumors of a female hare and grown in primary cercopithecus monkey kidney cultures, was not pathogenic for suckling mice (i.p.), mice (i.p.), hamsters (i.p.), rhesus monkeys (s.c.), cercopithecus monkeys (s.c.) or hares (s.c.). Primary cultures of swine, rhesus and cercopithecus monkey kidney cells were sensitive to the virus, while rabbit kidney, human amnion and chick embryo cells and certain cell lines (HeLa, KB, RC 37, and L) were not. The spectrum of CPE and antigenic properties of this virus differed from those of the myxomatosis and Shope fibroma viruses.

69-2854 SIGNIFICANCE OF VIRUS-LIKE PARTICLES IN PRECANCEROUS LESIONS OF EXPERIMENTAL GLIOMAS. (Jap.) Kawamura, Y. (Kyoto U. Med. Sch.). Nippon Geka Hokan (Arch. Jap. Chir.) 38(2):249-269, 1969.

In the author's colony of C3H mice, maintained in the animal colony of Kyoto University (KU colony), and in a colony of C3H mice maintained in the animal colony of the Montefiore Hospital of New York City (NYC colony), intracerebral implantation of 3-methylcholanthrene (MC) induced brain tumors in about the same frequencies; in the author's experiments, 10/20 mice developed brain tumors (6 gliomas, 2 sarcomas, 1 gliosarcoma, 1 squamous cell carcinoma) after implantation of MC powder. MC-induced preneoplastic lesions were ultrastructurally similar in most respects in mice of the KU and NYC colonies; the MC pellets were surrounded by 2 layers of limiting membranes, and engulfed by phagocytes and reactive astrocytes. In the mice of the NYC colony, these phagocytes and reactive astrocytes contained particles resembling immature or incomplete virus particles, associated with the endoplasmic reticulum. No such virus-like particles were noted in brain tissues from mice of the KU colony with preneoplastic brain lesions induced by MC or 1,2,5,6-dibenzanthracene. It is suggested that the virus-like particles seen in mice of the NYC colony might have resulted from an unknown specific tissue reaction to the carcinogen, or attraction of latent viruses to the tissues in the neighborhood of the implanted MC.

69-2855 CIRCULARITY AND SUPERCOILING OF VIRUS DNAs. (E.) Crawford, L. V. (Inst. Virol., Glasgow, Scotland). Int. Virol. 1:20-23, 1969.

69-2856 HOMOLOGY BETWEEN VIRAL DNA AND mRNA. (E.) Green, M., K. Fujinaga, M. Piña and D. Thomas. Int. Virol. 1:26-27, 1969.

69-2857 MECHANISM OF "SUPERINFECTION SUPPRESSION." (E.) Schlesinger, R. W., W. A. Strohl and H. Rouse. Int. Virol. 1:78-80, 1969.

69-2858 COMPLEMENTATION OF THE GENOMES OF SIMIAN PAPOVAVIRUS SV40 AND HUMAN ADENOVIRUS. (E.) Rapp, F. Int. Virol. 1:81-82, 1969.

69-2859 NEW TYPE OF PERSISTENT VIRUS INFECTION ASSOCIATED WITH INDUCTION OF STRONG TRANSPLANTATION ANTIGEN. (E.) Svet-Moldavsky, G. J., A. L. Liozner and D. M. Mkheidze. Int. Virol. 1:129, 1969.

69-2860 BIOCHEMISTRY OF RNA TUMOR VIRUSES. (E.) Galibert, F. Int. Virol. 1:132-136, 1969.

69-2861 THE NUCLEIC ACID OF THE MURINE SARCOMA-MURINE LEUKEMIA VIRUS COMPLEX. (E.) Benyesh-Melnick, M., N. Biswal, M. Grizzard and R. M. McCombs. Int. Virol. 1:136-137, 1969.

69-2862 GENETIC HOMOLOGY BETWEEN AN ONCOGENIC AND NON-ONCOGENIC RNA VIRUS. (E.) Rosenbergova, M. and J. Huppert. Int. Virol. 1:137-138, 1969.

69-2863 NUCLEASE ACTIVITY ASSOCIATED WITH AVIAN MYELOBLASTOSIS AND MYXOVIRUS. (E.) Rosenbergova, M. and S. Pristasova. Int. Virol. 1:138, 1969.

69-2864 VIRAL AND VIRUS-INDUCED ANTIGENS. (E.) Pasternak, G. Int. Virol. 1:138-146, 1969.

69-2865 PROTECTION AGAINST FRIEND LEUKEMIA BY MATERNAL ANTIBODIES AND VIRUS. (E.) Wahren, B. Int. Virol. 1:146, 1969.

69-2866 THE ANTIGENIC SPECIFICITY OF MURINE SARCOMA VIRUS-INDUCED TUMOR CELLS. (E.) Berman, L., J. C. Chuat and E. Klein. Int. Virol. 1:146, 1969.

69-2867 STUDIES ON THE RELATIONS BETWEEN VIRUS RELEASE AND CELLULAR IMMUNOSENSITIVITY IN MOLONEY (MLV)-INDUCED LYMPHOMAS. (E.) Fenyö, E., E. Klein and P. Bieberfeld. *Int. Virol.* 1:146-147, 1969.

69-2868 STUDIES WITH A MURINE SARCOMA VIRUS. (E.) O'Connor, T. E., P. J. Fischinger, M. Viola and J. B. Moloney. *Int. Virol.* 1:147-149, 1969.

69-2869 INTERACTION OF MOLONEY SARCOMA VIRUS WITH CELLS OF VARIOUS ANIMALS *IN VIVO* AND *IN VITRO*. (E.) Kukaine, R. A. and L. I. Nagayeva. *Int. Virol.* 1:149-150, 1969.

69-2870 *IN VITRO* STUDIES OF MOUSE SARCOMA VIRUS, MOLONEY STRAIN (MSV-M), ON BOVINE EMBRYO SKIN CELLS. (E.) Thomas, M., Y. Stoitchkov, J. Lasneret and M. Boiron. *Int. Virol.* 1:150, 1969.

69-2871 LOSS OF CELLULAR SENSITIVITY TO EXOGENOUS INTERFERON FOLLOWING INFECTION WITH THE VIRUSES OF THE MURINE-SARCOMA-LEUKOSIS COMPLEX. (E.) Peries, J., M. Canivet and M. Boiron. *Int. Virol.* 1:150, 1969.

69-2872 CELL FUSION AND THE RESCUE OF RNA TUMOR VIRUSES. (E.) Svoboda, J. *Int. Virol.* 1:150-154, 1969.

69-2873 VIROGENIC AND NON-VIROGENIC ROUS RAT SARCOMAS. (E.) Harris, R. J. C., F. C. Chesterman and R. McClelland. *Int. Virol.* 1:154-155, 1969.

69-2874 VIRUS-INDUCED TRANSPLANTATION RESISTANCE AGAINST ROUS SARCOMA ISOGRAFT. (E.) Bauer, H. *Int. Virol.* 1:155-156, 1969.

69-2875 ACTIVATION OF ROUS SARCOMA VIRUS IN TRANSPLANTED HAMSTER TUMORS WITH THE AID OF HETEROKARYON FORMATION. (E.) Sheviagyn, V., T. Biryulina, Z. Tikhonova and N. Karazas. *Int. Virol.* 1:156, 1969.

69-2876 ONCOGENIC ACTION OF SYNGENEIC EMBRYONIC TISSUE CULTURE CONTAINING THE INCOMPLETE ROUS VIRUS, ON ADULT MICE. (E.) Kryukova, I. N., I. B. Obuch and T. I. Biryulina. *Int. Virol.* 1:156-157, 1969.

69-2877 THE VARIABILITY OF THE LEUKOSIS STATUS IN AN INBRED CHICKEN GROUP. (E.) Sandelin, K. and T. Estola. *Int. Virol.* 1:157-158, 1969.

69-2878 ROUS SARCOMA IN BABOONS. (E.) Kalter, S. S., T. E. Vice, C. S. Kim and I. A. Ratner. *Int. Virol.* 1:158, 1969.

69-2879 CELL-FREE TRANSMISSIBLE LEUKOSES OF VIRAL ETIOLOGY IN SYRIAN HAMSTERS. (E.) Graffi, A., K. H. Horn, E. Bender, I. Graffi, T. Schramm and D. Bierwolf. *Int. Virol.* 1:158-159, 1969.

69-2880 PROPERTIES OF CARRIER CULTURES HARBORING A MOUSE LEUKEMIA VIRUS OF DECREASED VIRULENCE. (E.) Sinkovics, J. G. *Int. Virol.* 1:159, 1969.

69-2881 STUDIES ON THE ONCOGENIC VIRUS ISOLATED FROM QUAIL EMBRYO CELL CULTURES. (E.) De Ratuld, Y. and G. H. Werner. *Int. Virol.* 1:159-160, 1969.

69-2882 INDUCTION OF THE SYNTHESIS OF PAPOVAVIRUS SV40 IN CELLS TRANSFORMED BY THE VIRUS. (E.) Kit, S. *Int. Virol.* 1:163-170, 1969.

69-2883 STUDIES ON THE ACTIVATION OF VIRUS SYNTHESIS IN CELLS TRANSFORMED BY POLYOMA VIRUS. (E.) Fogel, M. *Int. Virol.* 1:170, 1969.

69-2884 NUCLEOTIDE SEQUENCE RELATIONSHIPS BETWEEN VIRAL GENES TRANSCRIBED IN CELLS INFECTED AND TRANSFORMED BY ADENOVIRUS. (E.) Green, M., K. Fujinaga and S. Mak. *Int. Virol.* 1:170-171, 1969.

69-2885 EFFECT OF ACTINOMYCIN D ON THE TRANSCRIPTION AND REPLICATION OF SV40 DNA. (E.) Sokol, F. and R. I. Carp. *Int. Virol.* 1:171-172, 1969.

69-2886 COMPLEMENTATION AMONG TEMPERATURE-SENSITIVE MUTANTS OF POLYOMA VIRUS. (E.) Di Mayorca, G., J. Callender, G. Marin and R. Giordano. *Int. Virol.* 1:173-177, 1969.

69-2887 ATTEMPTS TO ISOLATE TRANSFORMED CELL-DEPENDENT MUTANTS OF POLYOMA VIRUS. (E.) Benjamin, T. *Int. Virol.* 1:177-178, 1969.

69-2888 EFFECT OF WITHDRAWAL OF ARGININE ON THE REPLICATION OF SV40 VIRUS, AND ON THE SYNTHESIS OF THE T AND V ANTIGENS. (E.) Goldblum, N., Z. Ravid and Y. Becker. *Int. Virol.* 1:178, 1969.

69-2889 EFFECT OF FU AND BUdR ON THE INDUCTION OF THYMIDINE KINASE IN POLYOMA VIRUS-INFECTED MOUSE EMBRYO CELLS. (E.) Žemla, J. *Int. Virol.* 1:179, 1969.

69-2890 DEPENDENCY OF INCREASED DNA SYNTHESIS ON THE GROWTH PHASE OF SV40-INFECTED GREEN MONKEY KIDNEY CELLS. (E.) Werchau, H., G. Maass and R. Haas. *Int. Virol.* 1:179-180, 1969.

69-2891 DNA SYNTHESIS AND T ANTIGEN FORMATION DURING SV40-INDUCED TRANSFORMATION OF HAMSTER KIDNEY CELLS. (E.) Seemayer, N. *Int. Virol.* 1:180, 1969.

69-2892 RESULTS OF PRELIMINARY AND CRUDE FRACTIONATION OF THE T ANTIGENS OF VARIOUS ADENOVIRUSES. (E.) Hollinshead, A. C. *Int. Virol.* 1:180-181, 1969.

69-2893 EFFECTS OF UV-IRRADIATION ON THE TRANSFORMING AND PLAQUE-FORMING CAPACITIES OF SIMIAN ADENOVIRUS SA7. (E.) Casto, B. *Int. Virol.* 1:181-182, 1969.

69-2894 INFECTION AND TRANSFORMATION OF BHK21 CELLS BY TYPE 12 ADENOVIRUS. (E.) Schlesinger, R. W. *Int. Virol.* 1:182, 1969.

69-2895 *IN VITRO* TRANSFORMATION OF HUMAN FETAL LIVER CELLS BY SV40. (E.) Khoury, G. *Int. Virol.* 1:182-183, 1969.

69-2896 THE TRANSFORMATION OF RAT CELLS BY ADENOVIRUS TYPES 1, 2, AND 3. (E.) Van Der Noordaa, J. *Int. Virol.* 1:183, 1969.

69-2897 COMPLEMENTARITY BETWEEN DNA AND RNA. (E.) Valladares, Y., Y. Alvarez, E. Tabares and T. Pintado. *Int. Virol.* 1:183, 1969.

69-2898 SUPPRESSION OF CHEMICAL CARCINOGENESIS BY MEANS OF ARTIFICIAL HETEROGENIZATION. (E.) Svet-Moldavsky, G. J. and V. Hamburg. *Int. Virol.* 1:183-184, 1969.

69-2899 GROWTH AND REGRESSION OF POLYOMA-INDUCED TUMORS IN THE RABBIT. (E.) Postlethwaite, R., P. V. Best, I. B. Porteous and D. Blair. *Int. Virol.* 1:184, 1969.

69-2900 SKIN TUMORS IN HAMSTERS ACCOMPANIED AND PROBABLY CAUSED BY A NEW MEMBER OF THE PAPOVAVIRUS GROUP. (E.) Graffi, A. *Int. Virol.* 1:184, 1969.

69-2901 STRUCTURE AND DEVELOPMENT OF THE HERPES-TYPE VIRUS OF MAREK'S DISEASE. (E.) Achong, B. G., M. A. Epstein, A. E. Churchill and P. M. Biggs. *Int. Virol.* 1:184-185, 1969.

69-2902 AN APPARENT CHANGE IN THE HERPES-TYPE VIRUS OF MAREK'S DISEASE ON PASSAGE IN CELL CULTURE. (E.) Churchill, A. E. and R. C. Chubb. *Int. Virol.* 1:185-186, 1969.

69-2903 ISOLATION OF A CYTOPATHOGENIC AGENT FROM RECURRING DIGITAL FIBROUS TUMORS OF CHILDHOOD. (E.) Pohjanpelto, P. *Int. Virol.* 1:186-187, 1969.

69-2904 THE SEARCH FOR A DNA VIRUS AS AN ETIOLOGIC AGENT OF HUMAN CANCER. (E.) Sabin, A. B. *Int. Virol.* 1:189-194, 1969.

69-2905 ASSOCIATION OF GENITAL HERPESVIRUS WITH CERVICAL CANCER. (E.) Nahmias, A. J., Z. M. Naib and W. E. Josey. *Int. Virol.* 1:187-188, 1969.

69-2906 ASSOCIATION OF HERPESVIRUS TYPE 2 WITH CARCINOMA OF THE CERVIX. (E.) Rawls, W. E., W. A. F. Tompkins, M. E. Figueroa and J. L. Melnick. *Int. Virol.* 1:188-189, 1969.

69-2907 CARCINOMA OF THE CERVIX MAY BE ASSOCIATED WITH INFECTION BY GENITAL HERPES VIRUS. (E.) Rawls, W. E., W. A. F. Tompkins, M. E. Figueroa and J. L. Melnick. *Int. Virol.* 1:255, 1969.

69-2908 VIRUS INDUCTION BY CELL FUSION. (E.) Svoboda, J. (Inst. Exp. Biol. Genet., Prague) and J. F. Watkins. *Int. Virol.* 1:264-268, 1969.

69-2909 REOVIRUSES. (E.) Joklik, W. K. (Albert Einstein Coll. Med., Bronx, N. Y.) and A. Giovanardi. *Int. Virol.* 1:273-274, 1969.

69-2910 ASSOCIATION BETWEEN THE HERPES-TYPE VIRUS FIRST FOUND IN CULTURED BURKITT LYMPHOMA CELLS AND HETEROPHILE ANTIBODY-POSITIVE INFECTIOUS MONONUCLEOSIS. (E.) Benyesh-Melnick, M. *Int. Virol.* 1:287-291, 1969.

69-2911 FAGRAEUS' MIXED HEMADSORPTION (MH) TEST ON BURKITT LYMPHOMA CELLS. (E.) Magnusson, P., J. Espmark, G. Klein and W. Henle. *Int. Virol.* 1:291-292, 1969.

69-2912 A COMPARATIVE STUDY OF CHROMOSOME ABERRATIONS IN CELL CULTURES INDUCED BY TUMORIGENIC AND NON-TUMORIGENIC ADENOVIRUSES. (E.) Zatsepin, N. I., A. G. Stophanskaya, G. I. Oleinik, N. I. Lissenko and E. I. Gaidar. *Int. Virol.* 1:294-295, 1969.

69-2913 IMMUNOLOGIC AND MORPHOLOGIC MARKERS IN ADENOVIRUS 12-INDUCED TUMOR CELL LINES. (E.) Berman, L. *Int. Virol.* 1:295, 1969.

69-2914 ABSENCE OF REPLICATION OF THE DNA OF ADENOVIRUS TYPE 12 IN BHK21 CELLS. (E.) Doerfler, W. *Int. Virol.* 1:295-296, 1969.

69-2915 STUDIES ON THE SEROLOGICAL DIFFERENCES BETWEEN THE GROUP ANTIGENS OF VARIOUS ADENOVIRUSES. (E.) Döhner, L. *Int. Virol.* 1:296-297, 1969.

69-2916 INTERNAL PROTEINS OF ADENOVIRUS. (E.) Prage, L. and L. Philipson. *Int. Virol.* 1:298, 1969.

69-2917 ISOLATION OF AN INTERNAL COMPONENT FROM ADENOVIRUS TYPE 5. (E.) Laver, W. G., H. G. Pereira, W. C. Russell and R. C. Valentine. *Int. Virol.* 1:298-299, 1969.

69-2918 ELECTRON MICROGRAPHS OF DEGRADED ADENOVIRUS VIRIONS. (E.) Rubin, B. A. *Int. Virol.* 1:299-300, 1969.

69-2919 QUANTITATION AND SERIAL PASSAGES OF YABA VIRUS IN CULTURES OF A CONTINUOUS CYNOMOLGUS MONKEY KIDNEY CELL LINE. (E.) Tagaya, I. and Y. Tsuchiya. *Int. Virol.* 1:306-307, 1969.

See also abstract nos.: 2735,2740,2741,2743,2749,2752,2753,2976

69-2920 ON THE CONSEQUENCES OF MATCHING IN RETROSPECTIVE STUDIES WITH SPECIAL REGARD TO THE CALCULATION OF RELATIVE RISKS. (E.) Taube, A. (U. Uppsala, Sweden) and B. Hedman. *Acta Soc. Med. Upsal.* 74(1-2):1-16, 1969.

Mathematical models of retrospective studies in matched-pair populations are presented, with respect to calculations of the influence of an etiologic factor on the relative risk of a disease. The equations derived are based on a theoretical model of the relative risk of lung cancer in smokers and non-smokers. One method for estimating the relative risk from matched-pair data assumes that the population consists of pairs *a priori*; in this case, the information obtained for the retrospective study concerns those pairs in which 1 member becomes a proband. In another method of calculation (the "stratified matching" method), it is assumed that the population consists of strata with respect to matching variables, and for each proband a contrast is chosen from the same stratum. This "stratified matching" method of calculation is discussed with reference to a set of equations used to calculate the influences of smoking and urbanization on the lung. The changes in the value of the relative risk (K, in these equations) resulting from neglect of the matched-pair nature of the study group are also presented, with 2 empirical examples from previously published data (not on cancer epidemiology).

69-2921 TUMORS OF THE MUSCULAR LAYERS OF THE STOMACH. (Sp.) Presno-Albarrán, J. A. (U. Havana Sch. Med., Cuba), A. Garcia-Gutierrez, F. Conde-Otero and H. Gomez-Barry. *Bull. Soc. Int. Chir.* 27(6):533-541, 1968.

The records of the Gral. Calixto Garcia Hospital for 1961-1967 disclosed 31 tumors of the muscular layers of the stomach (0.02% of all clinical cases and 0.7% of all autopsy cases seen). These 31 tumors comprised 8.4% of all stomach tumors seen during this time; the 25 leiomyomas comprised 62.4% of all benign stomach tumors, while the 6 leiomyosarcomas comprised 1.8% of all malignant stomach tumors.

69-2922 RELATIONSHIP BETWEEN CANCER OF THE DIGESTIVE TRACT AND NUTRIENT INTAKE. (Fr.) Gregor, O. (Charles U., Prague), R. Toman and F. Prusova. *Rev. Med. Paris* 10(13): 741-752, 1969.

Analysis of stomach and intestinal cancer mortality rates from 28 nations (males; 1962-1963) showed a significant positive correlation between intestinal cancer mortality and av. dietary levels of total calories (TC) and animal proteins (AP) in 1947-1948 and 1962-1963. Stomach cancer mortality rates showed a significant inverse correlation with respect to dietary TC and AP levels in 1947-1948 only. A significant inverse correlation between stomach and intestinal cancer mortality rates (coefficient -0.85) was also noted. The stomach cancer mortality rate in Czechoslovakia was about 2.9-fold higher than in the U.S., whereas the intestinal cancer mortality rate was nearly 1.9-fold higher in the U.S. than in Czechoslovakia. Compared to the av. U.S. diet, the av. Czechoslovakian diet has a slightly lower TC content (about 5% below the U.S. level), a much higher total carbohydrate level, and much lower levels of AP, fats, and vitamins A, B_2 and C (approx. 63%, 70%, 73%, 55% and 75% of the av. U.S. levels, resp.). It is suggested that the wide differences in stomach and intestinal cancer mortality rates between these 2 nations may be related to the different av. AP levels in the diets. A relationship between these 2 tumors and dietary carbohydrate, fat and vitamin levels was suspected but could not be proved.

69-2923 TRENDS IN CANCERS OF THE DIGESTIVE TRACT. (E.) Cutler, S. J. (NCI, Bethesda, Md.). *Surgery* 65(5):740-752, 1969.

Age-adjusted incidence and mortality rates for g.i. cancer were obtained from 2 sources. Incidence rates (for 5-yr. periods from 1935-1939 through 1960-1964) were obtained from the Connecticut Tumor Registry; mortality rates (at 5-yr. intervals from 1930 through 1965) were for the entire U.S. The incidence and mortality rates for stomach cancer in both sexes showed a sharp, continuous decline. The incidence rate (females) and mortality rates (both sexes) for cancer of the esophagus remained stationary. Since the incidence rate for cancer of the esophagus in males showed an increase (to 1955-1959) followed by a decrease, it is suggested that the incidence pattern for this tumor in Connecticut may not be characteristic for the entire U.S. Incidence rates for cancer of the rectum in both sexes increased until 1950-1954, then declined; mortality rates showed a steady decline from 1940 onward. Incidence rates for colon cancer increased until 1955-1959 in males and until 1940-1944 in females, then remained stationary. Mortality rates from cancer of the intestine (colon and small intestine combined; the ratio of these 2 tumors in newly diagnosed cases is 27:1) remained stationary after 1940 in males, and showed a noticeable decline after 1945 in females. This difference between the incidence and mortality rates for colon cancer was attributed to more effective treatment and an improved survival rate.

69-2924 OESOPHAGEAL CANCER IN WALES. (E.) Ashley, D. J. B. (Morriston Hosp., Swansea, Wales). J. Med. Genet. 6(1):70-75, 1969.

In 1958-1963 (inclusive), the observed/expected numbers of deaths from cancer of the esophagus in Wales were 563/481.6 in males and 544/330.9 in females (total, 1107/812.5); the Standardized Mortality Ratios (SMR) in Wales, relative to England and Wales combined (E + W), were significantly elevated (117 in males, 164 in females; total, 136). SMR values in the Welsh population of Wales (persons with Welsh surnames and Welsh-speaking persons) were 142 in males and 237 in females, compared to 94 and 98, resp., for the non-Welsh population of Wales (most of whom come from England). The relative risk of developing this tumor in the Welsh population (compared to the non-Welsh population) was unexpectedly much higher in females than in males (2.42 and 1.51, resp.). The male:female ratio of gross death rates from this tumor in the 65-and-over age group (1961-1964) was 2.05:1 in E + W. Significantly higher values (a difference of 3 standard errors) were seen in the London-Southeastern, Midlands, and East and West Riding regions of England (2.35:1 to 2.43:1) and significantly lower values only in Wales (1.45:1 and 1.15:1 in "Wales I" and "Wales II," resp.). Excess mortality from this tumor was unrelated to iron-deficiency anemia or achlorhydria, which were equally prevalent in all areas of Wales, irrespective of the proportionate Welsh population. It is suggested that the high mortality from this tumor in the Welsh is related to genetic factors, possibly 1 or more genes carried on the X chromosome.

69-2925 GASTRIC CANCER IN WALES. (E.) Ashley, D. J. B. (Morriston Hosp., Swansea, Wales). J. Med. Genet. 6(1):76-79, 1969.

Stomach cancer mortality data in Wales for 1959-1963 (inclusive) were studied. Derived Standardized Mortality Ratios (SMR) for both sexes combined, corrected for population density, were 170 in the Welsh population (WP; Welsh speakers and persons with Welsh surnames) and 110 in the non-Welsh population (NWP). Population-adjusted SMR values were significantly above expected rates in women in Caernarvonshire, and significantly below expected rates in both sexes in Breconshire, for unknown reasons. Relative mortality rates (RMR; England + Wales, 1959-63 = 100) for men and women in 2 age groups (45-64 and 65-and-over), calculated for regions of varying proportional WP and for the "Wales I" and "Wales II" statistical regions, were all higher than expected. The RMR was generally lower in Wales I (the industrial southern region) than in Wales II (which includes most of the Welsh-speaking areas). The difference from the expected RMR was higher in the 65-and-over group than in the 45-64 yr. age group, suggesting the effects of genetic intermingling in the younger population. The stomach cancer risk was about 70% higher in the WP than in the NWP in both sexes. The sex difference in the liability of developing stomach cancer was small in the WP, but significantly large in the NWP. The excess of stomach cancer in the WP could not be attributed to blood type A (no excess was seen in the WP), or to a generally reduced fitness to reject environmental carcinogens (lung, colon and rectum cancers were no more prevalent in the WP than in the NWP). A genetically-determined increased susceptibility of the gastric epithelial cells to ingested carcinogens, or a reduced ability of the RES to reject cells of incipient stomach cancer, is suggested.

69-2926 CANCER PATTERNS AT KAIMOSI HOSPITAL IN WESTERN KENYA. (E.) Kisia, I. A. and D. P. Burkitt. E. Afr. Med. J. 45(11):706-712, 1968.

Cancer was confirmed in 315/over 26,000 pts. (1.2%) admitted to the Kaimosi hospital from 1957-1966 (inclusive); 172 other pts. with unconfirmed diagnoses were excluded from the group. At Kaimosi, the relative frequencies of cancer of the stomach (16.5%) and esophagus (7.5%) were higher than the rates reported in Kuluva (northwestern Uganda), Shirati (Tanzania) and Ishaka (Uganda). The high prevalence of stomach cancer at Kaimosi (the actual rate may be even higher than 16.5%) corresponded to the high rates seen in other high-altitude regions of Africa. Kaimosi Hospital is slightly over 5000 feet above sea level, though its referral area varies widely in altitude. Burkitt's lymphoma comprised 1.6% of all tumors at Kaimosi, compared to 11.8% at Shirati (more than 1000 feet lower than Kaimosi) and 19% at Kuluva. The high rate of cancer of the esophagus at Kaimosi corresponded to the high rates seen in the Western Nyanza region of Kenya, and was in contrast to the very low rates noted at hospitals only about 80 miles south (Shirati), 70 miles north (Toro) and 100 miles east (Nakuru) of Kaimosi. The people of the Kaimosi region make a distilled beverage of perhaps 50% alcohol content (waragi; popularly called "kill-me-quick"), which is drunk undiluted, mostly by men. The use of metal containers for storage of the distilled beverage, and of old kerosene cans for preparing the beer, has increased in recent times. No evidence of any steady increase in esophageal cancer with time was found, although the detection rate increased with the introduction of periodic reporting in 1965.

69-2927 TRACE ELEMENT LEVELS AND CARCINOMA OF THE NASOPHARYNX IN KENYA. (E.) Robinson, J. B. D. (P.O. Box 30148, Nairobi) and P. Clifford. E. Afr. Med. J. 45(11):694-700, 1968.

To study the hypothetical relationship between trace elements in staple food crops and the high incidence of carcinoma of the nasopharynx in the high-altitude regions of Kenya, soil samples and corn (maize) leaves were obtained from the farms of 41 families with histories of this tumor, and matched with samples from adjacent farms belonging to families without histories of this tumor. The 41 pairs of samples came from farms in 5 regions (Kericho, Kitui, Machakos, Kiambu and Fort Hall) where corn is a major staple food crop. Trace elements analyzed were nickel, lead, iron, manganese, zinc, copper, boron and molybdenum. Mean topsoil pH levels, and mean trace element levels in the plant samples, sometimes varied significantly from 1 region to another, but no significant differences were seen between the members of any sample pair. Soil pH levels and trace element levels in the plants were unrelated either to the prevalent soil type (red clay loams in 3/5 regions; sands or sandy loams in 2/5 regions) or to the underlying geology of the regions studied. It is concluded that the conc. of these trace elements in the indicator crop (and, by deduction, in the arable soils) is not obviously related to cancer of the nasopharynx.

69-2928 A CLINICAL STUDY OF HOARSENESS. (E.) Das, B. R. (Assam Med. Coll., Dibrugarh, India) and P. K. Das. Antiseptic 66(3):177-181, 1969.

Over an 18-mo. period, 14,931 outpatients were seen at the ear-nose-throat department of this hospital. Hoarseness was noted in 97 pts. (0.65%; 73 males, 24 females). Diseases of the larynx were found in 76/97 (78.3%), including 28 carcinomas of the larynx and hypopharynx (24 males, 4 females). The 21 extralaryngeal diseases included 9 cases of vocal cord paralysis resulting from cancer of the adjacent regions (thyroid, lung and esophagus). In addition to the 37 malignant tumors (38.1% of the group), 12 benign growths and 6 nodules of the vocal cords were seen. The high frequency of hoarseness in the 41-70 yr. age groups (39/97 pts.) was largely attributed to the presence of cancer (28/39 pts.). Most of the pts. with benign growths and nodules of the vocal cords were in the younger age groups. It is suggested that the high male:female ratio in the pts. with hoarseness (3.04:1, compared to 1.14:1 in the total population of Assam) might result from greater exposure to extremes of weather, excessive drinking or smoking, and abuse of the vocal cords, in males.

69-2929 SALIVARY GLAND NEOPLASMS IN CHILDHOOD. (E.) Galich, R. (U. Washington, Seattle). Arch. Otolaryng. (Chicago) 89(6): 878-882, 1969.

Less than 5% of all parenchymal salivary gland tumors, and less than 3% of all benign mixed salivary gland tumors, are found in children. Examination of the records of 2 Seattle hospitals for 1930-1966 (inclusive), disclosed parenchymal salivary gland tumors in 10/569,000 hospital admissions in children (18 yr. old or less). Tumors of mesenchymal or neurogenic origin were not considered. These 10 pts. were 3-18 yr. old at onset (7/10 were 10 or over) and 8/10 were girls. The group of tumors comprised 1 undifferentiated carcinoma, 2 mucoepidermoid carcinomas and 7 benign mixed tumors of the parotid (6), submaxillary (3) or palatal (1) salivary glands; no cylindromas were found.

69-2930 PRIMARY TUMORS OF THE LUNG IN CHILDREN. (Rus.) Klimanskii, V. A. (Res. Inst. Clin. Exp. Surg., USSR Min. Pub. Health, Moscow), A. I. Shekhter and M. G. Revzis. Vop. Onkol. 15(3):9-13, 1969.

From 1963-February, 1967, 230 children with respiratory diseases were seen at this hospital. Primary tumors of the lung were noted in 7/230 (3%); 4 tumors were benign (2 harmartomas, 1 adenoma, 1 histiocytoma) and 3 were malignant (1 fibrosarcoma, 1 hemangioendothelioma, 1 reticulum cell plasmacytoma). The rarity of primary sarcomas and plasmacytomas of the lung is pointed out.

69-2931 METHODS AND RESULTS IN THE DETECTION OF BRONCHIAL CANCER. (Fr.) Capronnier, C. (Hotel-Dieu Hosp., Paris) R. Rullière and M. Bariéty. Bull. Soc. Med. Hop. Paris. 119(13):997-1002, 1968.

Since X-ray examination detects only about 40% of all bronchial tumors, methods of improving the early diagnosis of bronchial cancer are discussed. It is suggested that sputum cytology, with its relatively low rates of false-negative (8-16%) and false-positive results (0.1-0.4%), should be added to the chest X-ray as a routine study for men over 40, smokers, persons in high-risk occupations, persons with suspicious chest X-ray findings, and pts. with chronic bronchitis. Other biological tests to detect the biochemical abnormalities found in pts. with bronchial cancer (reduced urinary folic acid and blood iron and cholinesterase; increased RBC sedimentation and blood levels of copper and several enzymes) are discussed.

69-2932 RESPIRATORY DISEASE IN AN URBAN ENVIRONMENT. (E.) Lepper, M. H. (P.O. Box 546, Miami, Fla.), N. Shioura, B. Carnow, S. Andelman and L. Lehrer. Industr. Med. Surg. 38(4):126-131, 1969.

Death rates from all respiratory diseases combined (including respiratory cancer, which is not considered separately) in Chicago were 6.75/1000 population in 1964 and 7.81/1000 in

1965. Socioeconomic status and exposure to varying levels of air pollution (SO_2 exposure in individual census tracts was used as the criterion of the air pollution level) both contributed to the age-, sex- and race-adjusted respiratory disease death rates/100,000/yr. However, the magnitude of the differences attributable to these factors was small, compared to the differences attributable to age, sex or race. Evidence for the association between respiratory disease deaths and both socioeconomic status and air pollution was weakened when the data for the white population and for adults were analyzed alone.

69-2933 CYTOLOGY OF PLEURAL EXUDATES. (Ger.) Morawetz, F. (Wilhelminen Hosp., Vienna). Wien Z. Inn. Med. 50(1):7-33, 1969.

From 1958-1966, 1073 pts. underwent a total of 1746 cytological examinations of pleural exudates. Malignant tumors were seen in 447/1073 pts. (41%); 256/447 pts. had cancer of the bronchus or pleural mesothelioma. In the pts. with cancer of the bronchus, pleural metastases were detected by the presence of tumor cells in 117/296 specimens of pleural effusions (69.4%); the cytological findings were suspicious in 28/296 (10.8%), negative in 49/296 (19.0%) and falsely positive in only 2/296 specimens (0.8%). Examination of 316 specimens from 191 pts. with extrapleural malignant tumors, predominantly cancer of the urogenital organs (63/191), g.i. tract (44/191) or breast (39/191), showed tumor cells in pleural exudates from 148 pts. (77.3%); the cytological findings were questionable in 20 pts. (10.5%) and negative in 23 pts. (12.2%). The group of 626 pts. with non-malignant pleural effusions included 7 pts. with benign tumors. Cytological examination of pleural exudates is recommended for the early diagnosis of pleural tumors.

69-2934 BONE TUMORS IN CHILDHOOD FROM THE CLINICAL POINT OF VIEW. (Ger.) Welte, W. (Child. Hosp., Cologne, Germany). Z. Kinderchir. 6(4):530-542, 1969.

Examination of the pediatric and surgical records of the author's hospital over a 5-yr. period (unspecified) showed only 22 bone tumors in children, accounting for less than 0.1% of about 29,000 cases. The rarity of bone tumors in children was confirmed by an examination of the records of Rheinland-Westfalen for an unspecified period. Bone lesions were found in 629 cases. In the 520 adults (83% of the group), 32% of the lesions were malignant and 27% were primary malignant tumors; in the 109 children (17% of the group), only 13% of the bone lesions were malignant and only 2% were primary malignant tumors. The predominant bone lesions in children were solitary osteochondromas and juvenile bone cysts; most of the malignant tumors were Ewing's sarcomas, osteogenic sarcomas and bone metastases from neuroblastoma. A distinct prevalence of the 10-14 yr. age group in children with benign and malignant bone tumors was noted.

69-2935 OSTEOGENIC, OSTEOLYTIC, OSTEOPLASTIC SARCOMAS; OSTEOFIBROSARCOMAS. (Fr.) Chigot, P.-L. (Trousseau Hosp., Paris) and G. Thuilleux. Rev. Prat. (Paris) 19(16): 2397-2412, 1969.

A survey of the records of this hospital (several thousand cases/yr.) for an unspecified 12-yr. period disclosed only 18 malignant bone tumors, 7 of which were osteogenic sarcomas. The etiology and pathogenesis of osteogenic sarcomas (including induction by radiation or other injuries) is discussed on the basis of previously published data.

69-2936 PAGET'S SARCOMA OF BONE: A STUDY OF EIGHTY CASES FROM THE BRISTOL AND THE LEEDS BONE TUMOUR REGISTRIES. (E.) Price, C. H. G. and W. Goldie. J. Bone Joint Surg. [Brit.] 51-B(2):205-224, 1969.

Records of the Bone Tumor Registries of Bristol (21.5 yr.; 1946-1967) and Leeds (9 yr.; 1959-1967) showed 107 Paget's sarcomas, 196 osteosarcomas and 55 fibrosarcomas in pts. over 40. In 80 pts. with well-documented, histologically confirmed Paget's sarcoma (aged 46-91 yr.), the corrected male:female ratio (2.4:1) was higher than the male:female ratio for any other primary bone sarcoma (without Paget's disease) in the British population. After correction for the population distribution by sex in persons over 40, the male:female ratio remained almost constant in each age group. In contrast to the declining relative incidence of other primary bone sarcomas in persons over 50, the relative incidence of Paget's sarcoma increased steadily with age. In Bristol and Leeds, the incidence rates/100,000/yr. for Paget's sarcoma were 0.16 and 0.18, resp., at all ages; in persons over 40, they were 0.36 and 0.40, resp. Incidence rates/100,000/yr. (all ages) for all primary bone tumors and for osteosarcomas were 1.42 and 0.36, resp. Paget's disease was found in 3.7% of all pts. over 40 in 1 survey of several autopsy series (previously published). Assuming an av. duration of 20 yr. for Paget's disease, the frequency of sarcomatous transformation was estimated at 0.2%. A world map showing the known "endemic" areas of Paget's disease is included; the highest known incidence rates are seen in England and in the plains of Western Europe. These data indicate that Paget's sarcoma is at least as common in the North of England as in the Southwest.

69-2937 AETIOLOGY OF TUMOURS OF THE URINARY BLADDER. (E.) Veys, C. A.

(124 Werburgh Dr., Trentham, Stoke on Trent, England). Urol. Int. 24(3):276-288, 1969.

The records of the Birmingham Regional Cancer Registry disclosed 600 bladder and kidney tumors since 1945. Records for these pts. were matched to the employment records since 1930 (20,000 records) of a rubber tire factory in this area, in which antioxidants containing residual free β-naphthylamine (NA) as a contaminant had been used until October, 1949. A total of 22 carcinomas (including 1 in a female) and 11 papillomas were found in 30 present and past employees of this factory; 15/30 had definitely been exposed to NA. The highest bladder tumor risk (estimated at 7-10%) was seen in persons handling NA-containing powders; persons exposed to NA-containing fumes showed fewer tumors. The bladder tumor frequencies (10 carcinomas, 6 papillomas) in 1400 men hired between 1934 and 1943, were significantly higher than the expected frequencies (3.5 and 1.4, resp.) in males (aged 20 yr. and over) in this region. The 1948-1967 records of this factory disclosed 16 carcinomas and 6 papillomas of the bladder among 7250 men hired before the end of 1949. However, 5 carcinomas and 5 papillomas of the bladder were seen among 7500 men hired after the end of 1949, when NA exposure had theoretically ceased. It is suggested that currently used methods of rubber processing might involve the release of α- or β-NA (even transiently), or may involve other bladder carcinogens of unknown nature. It is concluded that persons occupationally exposed to such compounds are at risk of bladder cancer throughout their lives.

69-2938 PRIMARY SARCOMA OF THE UROGENITAL SYSTEM IN ADULTS. (E.) Tripathi, V. N. P. (Lahey Clin. Found., Boston, Mass.) and V. S. Dick. J. Urol. 101(6):898-904, 1969.

The rarity of primary urogenital sarcomas in adults (excluding melanosarcomas, perirenal and retroperitoneal sarcomas, sarcomas of the female genital organs and of other viscera involving the urogenital system) is discussed, on the basis of a literature survey (30 references) and the records of 46 pts. with such tumors, seen at this 500-bed hospital over a 45-yr. period (1923-1968). The age range in this pt. group was 13-85 yr.; 13/46 were in the 51-60 age group and 14/46 were aged 61-70 yr. The most frequent tumors were 15 sarcomas of the kidney (including 2 Wilms' tumors) and 11 sarcomas of the bladder (sarcomas comprise 3.3% and about 0.5% of all malignant kidney and bladder tumors, resp.). These 2 groups showed a female preponderance. Sarcomas of the testis (the rarest of the non-germinal tumors, which comprise 3.5% of all testicular tumors) were seen in 5 pts. Sarcomas of the spermatic cord (the most common malignant tumor of the spermatic cord) were seen in 8 pts. Sarcomas of the prostate (0.1% of all malignant prostatic tumors) were seen in 5 pts. One pt. showed a sarcoma of the seminal vesicle, and 1 showed a collision tumor (fibrosarcoma and epithelioma) of the penis. No sarcomas of the ureter, urethra or scrotum were found.

69-2939 GYNECOLOGICAL CANCER AND BLOOD GROUPS ABO AND Rh. (Sp.) Lienhard, C. P. (Fac. Med., Buenos Aires), G. H. Fermepin, L. A. Parrilla and G. B. de Kohler. Obstet. Ginec. Lat.-Amer. 26(11-12):445-449, 1968.

Among 100 women with cancer of the breast (42/100), cervix (26/100), endometrium (18/100), ovary (8/100), vagina (3/100) or vulva (3/100) seen at the Central Military Hospital (Buenos Aires) in 1963-1965, the relative frequencies of blood types A, B, AB and 0 were 40%, 10%, 2% and 48%, resp.; 90% were Rh-positive and 10% were Rh-negative. The only difference from a control group (relatives of army personnel) was a relatively high frequency of blood type A in pts. with cancer of the endometrium (10/18).

69-2940 EXCRETION OF ABH BLOOD GROUP SUBSTANCES IN WOMEN WITH GYNECOLOGICAL CANCERS. (Ger.) Miluničová, A. (Blood Trans. Station, Prague), A. Jandová and V. Skoda. Z. Immunitaetsforsch. 138(1):90-93, 1969.

Excretion of ABH substances was studied in 291 women with cancer of the cervix, ovary or vulva (Group A) and 170 women with non-malignant diseases causing postmenopausal metrorrhagia (Group B); the control population was the population of Prague. About the same proportions of Group A and the controls were non-excretors (19.86% and 22.87%, resp.), but Group B showed a significantly lower proportion of non-excretors (11.90%) than the controls. Frequencies of non-excretors in cancer pts. with or without distant metastases (80/291 and 211/291 pts., resp.) were somewhat different (23.75% and 18.48%, resp.); this finding did not support the hypothesis that the excretion of these substances favors the metastatic spread of cancer. In Group A, 23.58% with blood type A, 17.97% with blood type 0, 14.89% with blood type B, and 7.69% with blood type AB, were non-excretors; this relative proportion of non-excretors was the reverse of that seen in the control group (18.19%, 21.16%, 37.84% and 41.67%, resp., were non-excretors). The patterns of ABH excretion and ABO blood type were similar in Groups A and B; in Group B, the difference from the controls was especially marked in the pts. of blood type B (11.54% were non-excretors).

69-2941 CYTOPATHOLOGICAL STUDY OF CERVICAL LESIONS. (Sp.) Pereira, G., (Cent. Soc. Security Hosp., San José, Costa Rica), Prada D. C. Cordero De Pratt and L. Romero De Pacheco. Rev. Med. C. Rica 26(416):27-33, 1969.

In 1966 and 1967, 10,000 women underwent cytological examinations at this hospital. Suspicious or positive lesions of the cervix (Class III-V) were found in 35/5416 pregnant and 95/4584 non-pregnant women (0.646% and 2.269%, resp.). The lesions were described as Class III, IV and V in 30/35, 4/35 and 1/35 of the pregnant women, resp., and in 73/95, 10/95 and 12/95 non-pregnant women, resp. Four of the pregnant women and 2 non-pregnant women were in the 16-20 yr. age group (all showed Class III lesions). Biopsy examinations were performed in 109 pts. Preneoplastic lesions (dysplasia or carcinoma in situ) and invasive cancer were found in 50%, 86% and 100% of the pts. with Class III, IV and V lesions, resp. In the total group of 10,000 women, the frequencies of preneoplastic lesions and invasive cancer were 0.50% and 0.15%, resp.

69-2942 SCREENING FOR UTERINE CANCER IN ICELAND. (E.) Thorarinsson, A. (U. Iceland, Reykjavik) O. Jensson and O. Bjarnason. Acta Cytol. (Balt.) 13(5):304-308, 1969.

Over a 3-yr. period beginning in June, 1964, 17,250 women aged 25-60 yr. (48.0% of the total female population) were examined for genital cancer in Iceland. Repeat examinations (2 yr. after the first) were performed in 4982/13,432 Reykjavik residents. The initial and repeat examinations combined disclosed 179 genital tumors (10.38/1000): 130 carcinomas in situ and 33 invasive or microinvasive carcinomas of the cervix (7.53 and 1.91/1000, resp.), 7 adenocarcinomas of the endometrium and 6 of the ovary (0.41 and 0.35/1000, resp.), 2 carcinomas of the vulva (0.12/1000) and 1 myosarcoma (0.06/1000). Cervical smears were cytologically negative in 1/33 with invasive carcinoma and 6/130 with carcinoma in situ of the cervix, 5/7 with cancer of the endometrium, the pt. with myosarcoma, and all pts. with cancer of the ovary or vulva. In the first examinations, the detection rates for carcinoma in situ and invasive carcinoma of the cervix were 6.85 and 1.56/1000, resp., in 13,432 residents of the Reykjavik area, compared to 6.78 and 2.60/1000, resp., in 3833 rural residents. In the repeat examinations of 4982 Reykjavik residents, detection rates for these 2 tumors were 1.81 and 0.40/1000, resp. About 87% of the invasive carcinomas of the cervix were Stage IA or IB lesions, compared to only 32% of the tumors seen in an earlier study (up to 1955).

69-2943 CERVICAL CYTOLOGY IN BELFAST. (E.) Willis, J. (Roy. Victoria Hosp., Belfast, N. Ireland) and J. Woods. J. Irish Med. Ass. 62(383):173-174, 1969.

A screening program was introduced into the obstetrics and gynecology clinics of the Belfast teaching hospitals in 1962. Results obtained in the first 25,000 examinations are presented. The majority of the women studied (16,644/25,000) were under 40. Carcinoma in situ was confirmed in 75 pts. and invasive carcinoma in 29 pts.; detection rates were 3.0 and 1.2/1000, resp. Detection rates for both lesions combined increased from 1.9/1000 at age 20-29 to 8.1/1000 at age 40-49, then fell to 5.4/1000 (2/369 pts.) in the over-69 age group. Detection rates for invasive carcinoma rose from 3.3/1000 at age 40-49 to a max. of 4.2/1000 at age 50-59. Detection rates for carcinoma in situ rose from 1.9/1000 at age 20-29 to a max. of 4.9/1000 at age 40-49. No invasive carcinomas were seen in women under 40. No carcinomas of the cervix were seen in the 467 women under 20. These 104 tumors comprised only the clinically unsuspected lesions. In view of the detection rates for in situ and invasive carcinomas in the younger age groups, routine screening of younger women is recommended.

69-2944 GYNAECOLOGICAL AND NON-GYNAECOLOGICAL ABNORMALITIES FOUND DURING A TWO-YEAR CANCER DETECTION SURVEY IN A CYTOLOGY CLINIC. (E.) Connon, A. F. (U. Adelaide, South Australia). Med. J. Aust. 1(7):329-332, 1969.

Of 1069 women examined between April, 1966-March, 1968 at the Queen Elizabeth Hospital in Woodville (South Australia), 5% showed a variety of abnormalities (including breast lumps in 2%) and 36% showed gynecological abnormalities. These genital abnormalities involved the cervix in 19.9% (cervicitis, contact bleeding, polyps and suspicious areas), the uterus in 4.1% (fibroids, uterine proplapse), the vagina in 8.8% (prolapse, discharge, infection), the ovaries in 1.0% (ovarian tumors), the vulva in 1.4% (including a tumor in 1/15) and unspecified areas in 1.1%. Despite the high proportion of cervical abnormalities noted on clinical examination, only 5.5% of 1010 cervical smears were cytologically abnormal in the first smear (compared to 3.18% in the second smear). Class III-V lesions (Papanicolau classification) were seen in 26 pts. (2.43%); 13 pts. (1.22%) showed dysplasia, 11 (1.03%) showed carcinoma in situ and 1 pt. (0.09%) showed a microinvasive carcinoma (Stage IA) of the cervix. The detection rates for unsuspected dysplasia and carcinoma in situ were 0.75% and 0.84%, resp.

69-2945 CERVICO-UTERINE DYSPLASIA. (Sp.) Golcher, L. G. Rev. Med. C. Rica 26(416):35-42, 1969.

The records of the National Cancer Institute of Mexico for 1949-1963 disclosed cervicouterine dysplasia in 399/20,710 women (1.9%). The age range was 20-89 yr., with the highest frequencies in the 31-40 and 41-50 yr. age groups; 168/399 were menopausal at diagnosis. These pts. tended to show the characteristic pattern of early coitus (at age 14-19 yr. in 244/399), early childbirth (at age 14-19 yr. in 157/399) and multiparity (135/399 had 6 or more children). Histories of dystocia and abortion were noted in 32/399 and 243/399, resp. Cancer antecedents (not further described) were positive in 53/399. Follow-up studies (the latest information was dated 1967) of 385/399 pts., usually treated with anti-inflammatory agents (296 pts.), hormones (30 pts.) or electrocoagulation (28 pts.), showed regression of the dysplasia in 324 pts. (81.2%), persistent but stationary dysplasia in 53 (13.5%) and progression to carcinoma in situ in 8 pts. (2.0%).

69-2946 DISCUSSION OF THE FIRST RESULTS OF THE DETECTION OF TUMORS OF THE UTERUS IN THE PROVINCE OF FORLI. (It.) Martuzzi, M. (Morgagni Hosp., Forli, Italy), G. Moggian and D. Amadori. Pathologica 60(887-888):301-307, 1968.

By October 15, 1968, 7709 women of Forli Province (18.4% of the total female population over 30) had undergone cytological examination of cervical smears. Most communities of this province had begun screening programs by October, 1967, but the first program was begun in July, 1965. Results are given on the basis of 7684 examinations. Severe epithelial dysplasia was seen in 12/7684 and cancer in 53/7684; 3 other cancers were found by other methods, in pts. who did not undergo cytological examination. Class I and II cytology was noted in 5504/7684 and 1905/7684, resp., Class III lesions in 217/7684, Class IV lesions in 27/7684 and Class V lesions in 28/7684. Histological examination of biopsy or surgical specimens from the 56 pts. with cancer showed 9 carcinomas in situ and 38 invasive carcinomas of the cervix, 2 adenocarcinomas of the endocervix, and 4 tumors of the corpus uteri (2 adenocarcinomas, 1 adenoacanthoma, 1 sarcoma). False-negative diagnoses (Class I or II cytology) were obtained from 4/7684 (0.05%; 6.5% of the cancer pts.) with invasive carcinoma of the cervix (2), adenocarcinoma of the endocervix (1) or adenoacanthoma of the corpus uteri (1). False-positive diagnoses (Class IV or V cytology without histological confirmation of cancer) were obtained from 7/7684 (0.09%).

69-2947 A HISTOLOGICAL AND HISTOCHEMICAL STUDY OF TROPHOBLASTIC DISEASE IN A FINNISH MATERIAL 1958-1962. (E.) Lauslahti, K. (Central Hosp., Tampere, Finland). Acta Path. Microbiol. Scand. Suppl. 201-1-71, 1969.

The epidemiology of hydatidiform mole, invasive mole and choriocarcinoma in Finland was studied, using data obtained during various periods from 1951-1967 (mostly from 1958-1962). The total group of tumors comprised 83 hydatidiform moles, 14 invasive moles and 15 choriocarcinomas. Hydatidiform moles and choriocarcinomas were about as frequent in Finland as in other Western nations (about 1:2000 and 1:28,000 deliveries, resp.), and showed about the same distribution according to age group, parity and the number of abortions. No evidence suggesting any contribution of socioeconomic factors, dietary deficiencies or tuberculosis in the etiology of these tumors was found. According to the Hertig system of clinical classification, the 83 hydatidiform moles showed a somewhat higher proportion of Class I and a somewhat lower proportion of Class III tumors (31% and 12%, resp.), than in other reported series. Most of the hydatidiform moles that became invasive (4/83 = 4.8%) or progressed to choriocarcinoma (3/83 = 3.6%) belonged to Class II. The tumors were examined histochemically by a variety of methods, which provided some information concerning the pathogenesis of the tumors; however, it was not possible to predict malignant transformation of an individual mole, or the prognosis of an individual choriocarcinoma, using these histochemical methods.

69-2948 THE PECULIAR AGE SPECIFIC INCIDENCE CURVE FOR CANCER OF THE BREAST - CLEMMESEN'S HOOK. (E.) Hakama, M. (Finnish Cancer Registry, Helsinki). Acta Path. Microbiol. Scand. 75(3):370-374, 1969.

An analysis of age-specific incidence rates for breast cancer in Denmark (1953-1957), Norway (1959-1961), Sweden (1959-1961) and Finland (1958-1962) supported the hypothesis that the "Clemmesen's hook" is caused by 2 types or components of breast cancer; the first component, with a peak at about age 50, has a better prognosis than the second component, with a peak at much higher ages.

69-2949 TUMORS OF THE BREAST: RATIO OF BENIGN TO MALIGNANT TUMORS; DECREASE IN PERCENTAGE OF AXILLARY METASTASES. (E.) McSwain, B. (Vanderbilt U. Sch. Med., Nashville, Tenn.) and J. S. Donahoo. J. Tenn. Med. Ass. 62(3):225-226, 1969.

The Vanderbilt University Hospital records for 1925-1960 (inclusive) disclosed 3363 pts. with breast tumors; 841 were malignant (including 3 sarcomas) and 2522 were benign. The relative proportion of benign tumors increased from 49% (337/689 pts.) in 1925-1945, to 84.4% (1046/1239 pts.) in 1956-1960. In 1961-1967, 1537 pts. with breast tumors were seen; 308 tumors were malignant (including 1 lymphosarcoma) and 1229 tumors (80.0%) were benign. When the 1961-1967 group was rendered comparable to the earlier groups, by excluding 88 pts. undergoing simple mastectomy (usually for far-advanced disease), the relative proportion of benign tumors was 84.9%. The number of pts./yr. with cystic disease increased from 6 in 1925-1945 to 175 in 1961-1967, but the number of pts./yr. with fibroadenomas or duct papillomas remained fairly constant after 1951 (39-41 and 5-6 pts./yr., resp.). The number of pts./yr. undergoing radical mastectomy for breast carcinoma was 17 in 1925-1945, 29 in 1946-1955 and 38 in 1956-1960, decreasing to 31 in 1961-1967. In the pts. undergoing radical mastectomy, the frequency of axillary metastases decreased steadily, from 70% in 1925-1945 to 42.8% in 1961-1967.

69-2950 MORBIDITY IN CHILDREN UNDER FOURTEEN IN SOUTH INDIA. (E.) Gupta, S. (Maulana Azad Med. Coll., New Delhi) R. K. Puri, O. C. Indira and S. P. Datta. Indian Pediat. 5(11):485-497, 1968.

Disease frequencies were studied in a total of 45,427 children from the Pondicherry area: 10,824 pediatric medical ward pts. (1961-1965 inclusive), 804 pts. in other wards (1965 only) and 25,661 children studied at the outpatient clinics (1965 only) of the Pondicherry General Hospital, as well as 1724 school children (over 9 yr. old), 980 preschool children, and 5434 children seen at a rural medical center. Children aged 0-4 comprised 56.4% of the total group, and 33.4% were in the 0-2 yr. age group. Malignant tumors are mentioned in only 2 groups: intra- and extra-abdominal tumors in 22/386 surgical ward pts. (5.6%), and leukemia in 13/14,442 pediatric outpatients (0.07%).

69-2951 NEOPLASMS IN CHILDHOOD. (Pol.) Betlejewski, S. (Otolaryng. Clin., Gdańsk, Poland) and T. Hervy. Otolaryng. Pol. 23(1):51-56, 1969.

From 1948-1967 (inclusive), 45 boys and 35 girls (aged 2 mo.-18 yr.) with head and neck tumors were seen at this clinic. This pt. group included 23 children with malignant tumors (12/23 were under 5 yr. of age), 47 with benign tumors, and 10 boys (in the 11-18 yr. age group) with juvenile papillomas of the larynx ("locally malignant benign tumors"). The number of cases/yr. ranged from none in 1950 to 8 in 1962, 1963 and 1966; the av. number of cases/yr. was 1.5 in 1948-1955 and 5.66 in 1956 and later. In the pts. with benign and malignant tumors (excluding the boys with papillomas of the larynx), no sex difference was noted; in the pts. with benign tumors, no age predilection was noted. The most frequent primary sites for the malignant tumors were the throat (12/23) and maxilla (4/23); 13/23 tumors were of hematopoietic and lymphatic origin. The most frequent primary sites for the benign tumors were the oral cavity (23/47), nose (9/47) and maxilla (6/47); 26/47 tumors were of vascular origin.

69-2952 REPORT OF A CASE OF FOUR PRIMARY MALIGNANT TUMORS. (Ger.) Zimmermann, G. (City Hosp., Salzburg, Austria). Krebsarzt 24(2):88-92, 1969.

Multiple primary malignant tumors are seen in about 5% of all pts. with cancer, but malignant tumors of 4 different primary sites are very rare (0.19% of 37,580 pts. in 1 previously reported series), as are multiple hormone-dependent primary tumors in males. One such case is described. This pt. (a 74-yr.-old man), who had undergone surgery for adenocarcinoma of the prostate 3 yr. previously, developed thyroid cancer ("malignant Langhans-type goiter"), reticulum cell sarcoma of 1 testis, and basal cell carcinoma of the facial skin (base of the nose) over an 11-mo. period. Three of these tumors (the exception was the basal cell carcinoma) were hormone-dependent. The course of the disease was relatively benign; the 3 hormone-dependent tumors recurred, but no metastases were noted. This particular combination of 4 primary malignant tumors has apparently not been reported previously.

69-2953 STATISTICAL OBSERVATIONS ON TUMORS OF THE EYE. (Jap.) Takahashi, K. (Gifu U. Sch. Med., Japan), H. Hattori, Q. S. leb, R. Nagayama and T. Kato. Jap. J. Clin. Ophthal. 23(3):295-300, 1969.

From 1956-1965 (inclusive), 57,190 pts. were seen at the authors' ophthalmology clinic. Tumors of the eye were seen in 129 pts. (0.225%; including 39 children aged 0-10 and 25 pts. aged 11-20 yr.); 38/129 tumors (29.5%) were malignant. The malignant tumors included 13 retinoblastomas, 12 carcinomas and 8 sarcomas of the ocular adnexa, and 5 melanosarcomas.

69-2954 DIAGNOSIS AND TREATMENT OF MALIGNANT TUMORS OF THE NOSE. (Sp.) De Lizardi Calderon, E. and F. J. Rodriguez Suarez. Rev. Med. Hosp. Colonia 18(95):21-28, 1969.

Examination of 2 series of records from Mexico City (including the 1966 and 1967 records of the Colonia Hospital) disclosed malignant tumors of the nose and paranasal sinuses in 29/17,149 pts. (0.16%); 16 males and 13 females. The majority of the pts. (18/29) were over 51 (8/18 were in the 61-70 yr. age group); 1 pt. was in the 0-10 yr. age group and 1 was in the 11-20 yr. age group. The tumors comprised 13 epidermoid carcinomas, 10 melanomas, 3 lymphosarcomas, 1 reticulum cell sarcoma and 2 adenomas.

69-2955 NODAL AND EXTRANODAL MALIGNANT LYMPHOMA IN ISRAEL: AN EPIDEMIOLOGICAL STUDY. (E.) Modan, B. (Tel Hashomer Government Hosp., Israel) M. Shani, B. Goldman and M. Modan. Brit. J. Haemat. 16(1-2):53-59, 1969.

Distributions of nodal and extranodal malignant lymphoma (ML; including Hodgkin's disease, reticulum cell and lymphosarcoma, giant follicular lymphoma and unspecified types of ML) according to age and ethnic group, were studied from the records for 832 histologically confirmed cases reported in Israel in 1960-1964 (inclusive). Tumor distribution patterns in the Israeli-born resembled the patterns seen in the ethnic groups of their parents. The age- and ethnic group-specific distribution of extranodal ML (most prevalent in the younger age groups, Arabs, and persons of Asian or African origin) resembled that reported for Burkitt's lymphoma. The differences in tumor distribution suggested the presence of differential susceptibilities of both tissues and subjects to carcinogenic influences. (Some of this information has been published elsewhere; see CRA 7(5):#1108; May, 1969).

69-2956 DIFFERENTIATION IN A TRANSPLANTABLE RAT TUMOUR MAINTAINED IN ORGAN CULTURE. (E.) Ellison, M. L. (U. Pennsylvania, Philadelphia), E. J. Ambrose and G. C. Easty. Exp. Cell Res. 55(2):198-204, 1969.

A spontaneous, highly anaplastic rat kidney tumor usually showed no signs of differentiation (kidney tubule formation) through numerous passages. When transplant generation 52 of this tumor was cocultivated in short-term cultures (up to 3 wk.) with embryonic "inducing tissues" (dorsal spinal cord from 12-13-day-old rat or mouse embryos), however, kidney tubule formation was noted in 1/28 explants. Evidence of differentiation was also noted in 1 control explant (grown without the inducing tissue), a long-term culture without inducing tissue (exposed to embryonic extract), and in the tumor sample obtained from the rat at the time of explantation. It is concluded that this tumor retained, in latent form, the genetic information required for differentiation, and that differentiation was enhanced, but not induced, by exposure to the inducing tissues. No differentiation was noted in long-term cultures (up to 12 wk.) of 1 rat tumor (Walker carcinoma), 1 mouse tumor (Sarcoma 180), 1 chicken tumor (dimethylbenzanthracene-induced sarcoma) or 1 human tumor (a metastatic kidney tumor). The signs of differentiation in the rat kidney tumor were accompanied by the appearance of necrosis and a markedly reduced growth rate; the nature of this association between differentiation and reduced growth rate was not determined.

69-2957 THE LOGNORMAL FREQUENCY DISTRIBUTION AND HUMAN CANCER. (E.) Spratt, J. S., Jr. (Ellis Fischel State Cancer Hosp. & Cancer Res. Ctr., Columbia, Mo.). J. Surg. Res. 9(3):151-157, 1969.

The skewed frequency distributions of many parameters of the behavior of human cancer can often be plotted as lognormal curves, which permits an accurate description of the geometric mean (equivalent to the mode of logarithmic distribution) and a more efficient calculation of extremes of behavior of these tumors. Several examples of the lognormal frequency distributions of the natural history of human cancer are plotted from the author's previously published reports.

69-2958 DIFFERENCES IN THE PROLIFERATIVE ACTIVITY OF MYELOCYTES FROM BONE MARROW, SPLEEN AND PERIPHERAL BLOOD IN CHRONIC MYELOID LEUKAEMIA. (E.) Brandt, L. (U. Hosp., Lund, Sweden). Scand. J. Haemat. 6(2):105-112, 1969.

The proliferative activities of myelocytes from the peripheral blood, bone marrow and spleen of 8 pts. with chronic myeloid leukemia (studied by autoradiography using tritiated thymidine) varied from 1 stage of the disease to another. Bone marrow and extramedullary (splenic) proliferative activities differed from each other in several respects; extramedullary proliferation was increasingly predominant with increasing signs of relapse. The similarity of the peripheral blood cells to the bone marrow cells (rather than to the spleen cells) suggested that the peripheral blood cells were probably not merely an extension of the splenic myelocytes, and that an exchange of cells between the peripheral blood and the spleen was less probable than an exchange between the blood and bone marrow. The data provided no explanation for the differences in proliferative activity between the bone marrow and the spleen.

69-2959 GROWTH KINETICS OF SQUAMOUS CELL CARCINOMA IN MAN: A STUDY OF FOUR SQUAMOUS CELL CARCINOMAS USING STATHMOKINETIC EFFECT OF VINBLASTINE IN VIVO. (E.) Meyer, J. S. (U. Missouri Med. Ctr., Columbia). Arch. Path. (Chicago) 87(5):479-490, 1969.

The stathmokinetic effects of periodic infusions of vinblastine were used to study the growth kinetics of 4 inoperable squamous cell carcinomas of the alveolar ridge (1/4), lip (1/4) or tongue (2/4). Tumor generation times (estimated by counting the cells in metaphase arrest in serial biopsies) were 6-9 days in 3/4 tumors, and possibly 24 days in 1/4. The durations of mitosis were 17-92 min. The durations of DNA synthesis (studied by autoradiography using tritiated thymidine) were 4.6 hr. in 1 tumor and 39 hr. in another. The tumor showing the longest durations of mitosis and DNA synthesis showed a relatively slow growth rate, a long clinical course, and a good response to infusions of a DNA synthesis inhibitor (5-fluoro-2'-deoxyuridine). These stathmokinetically-determined tumor generation times (which were probably greater than the true generation times) were consistent with the highly malignant behavior of the tumors.

See also abstract nos.: 2730,2731,2732,2733,2734,2744,2745,2747,2753,2754,2768,2769,2772,2809,2852,
2905,2906,2907

69-2960 ACUTE LYMPHOBLASTIC LEUKEMIA IN SIBLINGS WITH PROGRESSIVE CEREBELLAR ATAXIA (LOUIS-BAR SYNDROME). (Ger.) Lampert, F. (U. Erlangen-Nuremberg, Germany). Deutsch. Med. Wschr. 94(5):217-220, 1969.

A family with histories of both the Louis-Bar syndrome (the symptoms began in infancy or early childhood) and cancer is described. The proband, with the Louis-Bar syndrome, died of acute lymphoblastic leukemia at about age 15 yr. His older brother, also with the Louis-Bar syndrome, had died of acute lymphoblastic leukemia at age 3 yr. The oldest sister (22 yr. old) also had the Louis-Bar syndrome, but no signs of malignant disease; another sister (20 yr. old) and the parents were normal. An acentric chromosomal fragment (corresponding to #22) was seen in 4/9 leukemic bone marrow cells from the proband; in the bone marrow cells, the modal chromosome number was 46. Bone marrow cells from the mother were cytogenetically normal. The proband showed normal levels of serum γA (in contrast to the deficiency or absence of γA reported in other pts. with the Louis-Bar syndrome) and elevated levels of serum γG and γM; the mother showed elevated serum γG levels. Three female cousins of the proband's mother had died of Hodgkin's disease (age 24 yr.), breast cancer (age 47 yr.) or a "malignant collagen disease" (age 55 yr.).

69-2961 CHRONIC MYELOID LEUKEMIA IN MONOZYGOTIC TWINS. (Ger.) Kosenow, W. (City Hosp., Krefeld, Germany) and R. A. Pfeiffer. Deutsch. Med. Wschr. 94(22):1170-1176, 1969.

A 7-yr.-old girl with chronic myeloid leukemia (CML) of the adult type is described. The Philadelphia (Ph^1) chromosome was found in bone marrow cultures. This pt. had been treated with irradiation (400 r) for a facial hemangioma in infancy. One relative had died of acute myeloid leukemia in middle age. This child's identical twin sister was normal and showed no Ph^1 chromosome in the bone marrow cells. A literature survey (30 references) disclosed only 5 other cases of CML in members of identical twin pairs. All of the pts. were male and showed Ph^1-positive CML. In 1 case, both twins (64 yr. old) and an older brother (68 yr. old) developed CML; in the other 4 cases, 1 twin developed CML (at age 16-36 yr.) and the other was normal.

69-2962 CYTOGENETIC STUDIES IN FAMILIAL LEUKAEMIAS. (E.) Baikie, A. G. (U. Tasmania, Australia), O. M. Garson, A. S. D. Spiers and J. Ferguson. Aust. Ann. Med. 18(1):7-11, 1969.

A 31-yr.-old man, whose mother had died of chronic granulocytic (myeloid) leukemia (CML) 13 yr. previously, developed typical CML. The Philadelphia (Ph^1) chromosome was found in peripheral blood and bone marrow cultures (obtained during a relapse) but not in skin fibroblast cultures, suggesting that the Ph^1 chromosome was an acquired, not hereditary, abnormality. No cytogenetic studies of leukemic cells from the mother were possible. The second case of familial leukemia comprised a 15-yr.-old girl with acute leukemia and her father (42 yr. old) with CML, diagnosed within a single 6-mo. period. Cytogenetic studies of leukemic cells from the father were not possible, but the daughter had Ph^1-negative leukemia. Both father and daughter had occasionally been exposed to small amounts of benzene. A distant relative of the girl's mother (not known to be related to the father) had died of lymphocytic lymphosarcoma 12 yr. before the father and daughter developed leukemia. Neither of the families showed histories of leukemia, mongolism, or known abnormalities of the sex chromosomes.

69-2963 SPORADIC ANIRIDIA AND WILMS' TUMOR. (E.) Flanagan, J. C. (Wills Eye Hosp., Philadelphia, Pa.) and A. M. DiGeorge. Amer. J. Ophthal. 67(4):558-561, 1969.

The frequencies of aniridia in the general population and in children with Wilms' tumor were estimated at 1:50,000 and 1:59, resp. The 11 reported cases of Wilms' tumor and aniridia (always aniridia of the sporadic type) comprised 9 males and 2 females, although familial aniridia affects both sexes about equally. The authors' group of 7 pts. with sporadic aniridia included 3 young children (1 boy, 2 girls; 3-18 mo. old at the first examination), 3 older children (2 boys, 1 girl; 5-9 yr. old), and a 23-yr.-old woman. Associated urogenital defects were noted in 1/7 (an 18-mo.-old boy). Wilms' tumor was found in a 13-mo.-old girl, who had shown no signs of a renal mass at age 3 mo. It is recommended that all children with sporadic aniridia, especially males and children with associated urogenital anomalies, should undergo regular follow-up examinations (physical examinations and i.v. pyelography at 3- and 6-mo. intervals, resp., to age 3 yr.; thereafter, at 6-mo. and 1-yr. intervals, resp.), to detect Wilms' tumor in the early stages. The authors' 4 oldest pts. were followed up ophthalmologically.

69-2964 BLOOM'S SYNDROME. I. GENETICAL AND CLINICAL OBSERVATIONS IN THE FIRST TWENTY-SEVEN PATIENTS. (E.) German, J. (New York Blood Ctr., N. Y.). Amer. J. Hum. Genet. 21(2):196-227, 1969.

Data on the first 27 known cases of Bloom's syndrome (congenital telangiectatic erythema and severe growth retardation) are presented.

Blood and skin cell cultures from all pts. showed a characteristic pattern of chromosomal breaks and rearrangements. These 17 male and 10 female pts. belonged to 21 families (6 sibling pairs were found), 12 of which were of Jewish origin. The gene for Bloom's syndrome (transmitted as an autosomal recessive condition) was of higher prevalence in the Jewish population than in the non-Jewish population; at least 11 of the affected Jewish families had come from a well-defined area of eastern Europe (Lvov-Cracow-Beretschkow), which was clearly different from the region of ancestral origin of persons with Tay-Sachs disease. Consanguinity of the parents was more frequent in the non-Jewish families (6/9) than in the Jewish families (1/12). As of the middle of 1967, the mean ages of the 15 living males and the 7 living females were 14.7 and 7.3 yr., resp. Of the 6 pts. (all males) who had passed the age of 20, 3/6 had died of leukemia (2/3) or squamous cell carcinoma of the tongue (1/3); the oldest living pt. was 34 yr. old. None of the females was known to be alive beyond the age of 14 yr., and 1 female had died of leukemia at age 13 yr. Six additional cases are mentioned and briefly described.

69-2965 MALIGNANT DEGENERATION OF SKIN LESIONS IN EPIDERMODYSPLASIA VERRUCIFORMIS. (E.) Ruiter, M. (U. Groningen, Netherlands). Acta Dermatovener (Stockholm) 49(3):309-313, 1969.

A 22-yr.-old mentally retarded man with typical epidermodysplasia verruciformis showed malignant degeneration of several facial lesions; histological examination showed bowenoid carcinomas. The pathological changes were less marked in an apparently older lesion from the back of 1 hand. The virus associated with this disease is closely related (if not identical) to the human wart virus. It is suggested that the malignant transformation seen in a high percentage of pts. with epidermodysplasia verruciformis (27% of cases in 1 series) may result from an interaction of the virus with the genetically altered skin. Electron microscopic examination of the malignant lesions showed no complete virus particles.

69-2966 CASE OF EPITHELIOMA DEVELOPING ON A PILONIDAL SINUS. (Fr.) Boutet, M. (Hotel-Dieu Hosp., Quebec, Canada). Laval Med. 40(5):456-459, 1969.

A 64-yr.-old man with a pilonidal sinus (of the sacral region) of 15 yr. duration, who had undergone the most recent of several operations for recurrences 2.5 yr. previously, underwent wide excision of a recurrent, ulcerated lesion. A well-differentiated spinocellular carcinoma was seen at the margins of the ulcer. No signs of local extension or distant metastases were present. A literature survey (10 references) disclosed 22 similar cases (19 males, 3 females).

69-2967 GARDNER'S SYNDROME: A CHALLENGE IN CANCER PREVENTION. (E.) Johnson, J. G. (West Virginia U. Med. Ctr., Morgantown), A. L. Watne and B. Zimmermann. Med. Times 97(4):151-157, 1969.

The pathological signs and genetic aspects of Gardner's syndrome (soft tissue masses, bony tumors and polyposis of the colon) are discussed, on the basis of data concerning 325 persons (37 of whom are now dead) belonging to 4 families, which may or may not be related. One or more of the signs of Gardner's syndrome developed in 66/325; 41/66 showed more than 1 sign, and 16 showed the complete triad. Polyposis of the colon was never seen as the only sign of the disease. None of the pts. with untreated polyposis of the colon lived beyond the age of 50 yr. without developing adenocarcinoma of the colon. The preponderance of pts. showing more than 1 sign of Gardner's syndrome, and the absence of pts. showing polyposis of the colon only, suggested that a single gene (separate from that responsible for familial polyposis) is involved in this syndrome. It is concluded that persons with Gardner's syndrome can be classified into 2 groups: pts. with the complete triad of signs, who may or may not have positive family histories; and pts. with 1 or more of these signs, who have relatives showing the complete triad.

69-2968 COEXISTENCE OF AN EARLY FORM OF MUCOUS MEMBRANE CARCINOMA WITH MENETRIER'S DISEASE. (Pol.) Urbańska-Bonenberg, L. (Intern. Occup. Dis. Clin., Silesia Med. Acad. Zabrze, Poland), K. Smigla and A. Kozłowska. Wiad. Lek. 22(4):403-406, 1969.

In a 36-yr.-old man with Menetrier's disease, gastric surgery and histological examination revealed atypical mucus-containing cells in the mucous membrane, in addition to the typical changes of Menetrier's disease (hypertrophic gastropathy). It was concluded that these cells represented an early stage of mucous membrane carcinoma, with the characteristics of a carcinoma *in situ*. Lung metastases were observed 2 yr. later.

69-2969 CANCER CAMOUFLAGE. (E.) Graham, R. (Roswell Park Mem. Inst., Buffalo, N. Y.) and J. Graham. Surg. Gynec. Obstet. 128(4):735-744, 1969.

Vaginal cells obtained from women with genital cancer (especially premenopausal women) sedimented more slowly in methanol suspension than cells obtained from normal women. Slow cellular sedimentation rates were noted in 47% of all preparations studied, which included preparations from 84% of the cancer pts. This cellular sedimentation method was recommended for screening studies, but had no diagnostic value. The slow sedimentation rate of the cells from cancer pts. resulted from the presence of an amorphous polypeptide substance (removable by water or alcohol washing), which was produced in large quantities by the tumor cells, and coated both the tumor cells and adjacent normal cells. This polypeptide was believed to be a local manifestation of the "tolerance agent" (also found in pregnancy urine and the placenta), which reduces host defenses in cancer pts. It is suggested that all tumors produce such a polypeptide, which is antigenically inert but interferes with the antigen-detecting sites of the normal cells in such a way that they cannot recognize the presence of the tumor. It is postulated that tumor cells cannot survive unless their antigenicity is shielded by such a substance.

69-2970 QUANTITATIVE ACTIVATION-ANALYTICAL DETERMINATION OF SEVERAL ELEMENTS IN SEVERAL ORGANS AND IN CANCER TISSUE. (Ger.) Schicha, H. (Inst. Atomic Res., JÜlich, Germany) H. J. Klein, K. Kasperek and F. Ritzl. Beit. Path. Anat. 138(3):245-271, 1969.

Trace element levels were determined by neutron activation analysis in 67 autopsy tissue specimens (portal blood, liver, bronchial mucosa, lung, primary or metastatic tumor), from 8 pts. with bronchial carcinoma (1/8 also had chronic myeloid leukemia), 1 pt. with a Grade II oligodendroglioma, 1 pt. with a teratocarcinoma of the testis, and 5 pts. without malignant tumors (including 1/5 with an acoustic neurinoma). The tumor tissues differed from the normal tissues in several respects. The iron conc. was reduced in all tumor tissues (possibly resulting from a reduction of respiratory enzyme activities). The non-tumor-bearing liver tissues from all cancer pts. showed a reduced zinc conc., irrespective of the location of the metastases. Zinc, bromine, antimony, mercury, selenium and phosphorus levels tended to be elevated in the tumor tissues. Levels of the other trace elements (sodium, chloride, potassium, iodine) varied from 1 specimen to another.

69-2971 CONTRIBUTION TO THE STUDY OF ANTI-GAMMA-GLOBULINS IN THE SERA OF CANCER PATIENTS. (Fr.) Lille-Szyszkowicz, I. (René Huguenin Cancer Res. Ctr., St. Cloud, France), P. Gabay, L. Podliachouk, A. Eyquem, J. S. Bourdin and R. T. Saracino. Z. Immunitaetsforsch. 138(2):154-160, 1969.

Sera from 270 cancer pts. (excluding pts. over 70 and pts. admin. multiple transfusions or chemotherapy) and 184 controls (excluding pts. with rheumatoid arthritis, collagen diseases, liver cirrhosis or infections) were examined for the presence of γ-globulin antibodies (AGG). AGG activity was found in 52/270 and 16/184 sera (19.2% and 8.7%), resp.; the difference was statistically significant. Rheumatoid factor was found in 12/52 AGG-positive and 4/218 AGG-negative sera from cancer pts., and in 5/16 AGG-positive control sera. Frequencies of AGG activity were higher in sera from pts. with leukemia and lymphoma (6/18) or cancer of the ear-nose-throat region (16/60 = 26.6%), bronchus (7/22) or g.i. tract (7/26), than in sera from pts. with breast cancer (5/55 = 9.09%), uterus (4/28), bladder (1/14), skin (0/16) or other sites (6/31). AGG activity in most of the sera from cancer pts. was non-specific with respect to the Gm groups. Hemagglutinating activity was usually classified with the IgM (19S) globulins, but was independent of the IgM globulins in 4 sera. The AGG seen in these sera was similar in some respects (but not all) to rheumatoid factor. The mechanism of the appearance of AGG activity in the cancer pts. could not be explained (especially since pts. over 70 and multiply transfused pts. were not considered).

69-2972 SEX CHROMATIN IN OVARIAN TUMORS. (Ger.) Egawa, J. (U. Surg. Clin., Yonago, Japan). Endocr. Jap. 16(1):17-20, 1969.

Sex chromatin (SC) frequencies were studied in ovarian specimens from 55 pts. (200-300 nuclei were examined in each specimen). The 11 normal specimens always showed a female SC frequency (defined as over 10% of the cells; the range of frequencies was 11-33%). Most of the 25 benign tumors showed female SC distributions, but 4 showed intermediate SC frequencies (defined as 5-10% of the cells); the range was 8-23%. The widest range of SC frequencies (3-21%) was noted in the 17 malignant tumors, some of which showed male SC frequencies (defined as less than 5% of the cells). Specimens from 2 phenotypically female pts. with Turner's syndrome showed male SC frequencies (3% or 4%). Mosaic-like patterns were seen in 5 adenocarcinomas and 2 benign dermoid cysts. Some of the malignant tumors showed multiple SC particles.

69-2973 CLONAL EVOLUTION IN DI GUGLIELMO SYNDROME. (E.) Krompotic, E. (Chicago Sch. Med., Ill.) S. Silberman, M. Einhorn, E. S. Uy and P. R. Chernay. Ann. Genet. (Paris) 11(4):225-229, 1968.

Chromosomes from peripheral blood and bone marrow cells were examined several times during the 4.5-mo. course of Di Guglielmo's acute erythroleukemia in a young woman. An aneuploid stemline, showing trisomy of what appeared to be a Group A chromosome (47XX, ?A+), was seen throughout this time, persisting through the early, middle and late stages of the disease (erythroblastic, mixed erythroblastic and myeloblastic, and predominantly myeloblastic proliferation, resp., of the bone marrow cells). Two additional stemlines, showing trisomy of either a Group C or a Group G chromosome, were seen during the terminal stages of the disease, but the presence of the same extra Group A chromosome in these 2 clones indicated their descent from the original aneuploid stemline.

69-2974 PERIMODAL VARIATION OF DNA VALUES OF NORMAL AND MALIGNANT CELLS. (E.) Atkin, N. B. (Mt. Vernon Hosp., Northwood, Middlesex, England). Acta Cytol. (Balt.) 13(5):270-273, 1969.

Perimodal variations of DNA content (falling within ±35% of the main modal values) were studied by microspectrophotometry in interphase nuclei of 119 malignant tumors (including 68 carcinomas of the cervix) and 11 normal tissues. In nearly 50% of the tumor cells, the perimodal variations of DNA values were within ±5%. Coefficients of variation for the high-mode cells and for tumor cells of up to triploid modes were 11.0% and 10.0%, resp. The normal cells showed very little variation from the diploid mode. The data suggested that each tissue sample had a single stemline, aside from minor lines arising from polyploidization or (in a few tumors) a major line arising from polyploidization of another stemline. The data also suggested only a moderate degree of variation in chromosome number about the modal stemline value. Preinvasive lesions of the cervix uteri resembled invasive tumors in showing DNA values that tended to cluster around a mode, which varied from 1 pt. to another.

69-2975 STUDIES ON IN VITRO RELEASE OF CYTOPLASMIC ENZYMES AND NUCLEIC ACIDS FROM EHRLICH ASCITES TUMOR CELLS INTO SURROUNDING MEDIUM. (E.) Kanamaru, R. (Tohoku U., Sendai, Japan). Tohoku J. Exp. Med. 97(4):317-328, 1969.

Under anaerobic conditions, cultures of Ehrlich ascites carcinoma cells released several cytoplasmic enzymes into the medium. The amounts of 6-phosphogluconate dehydrogenase and glucose-6-phosphate dehydrogenase released, comprised almost 30% of the initial cellular levels. Enzymes released in smaller relative proportions included lactate, malate and isocitrate dehydrogenases, phosphofructokinase and glutamic-oxalacetic transaminase. No enzyme release took place under aerobic conditions, unless aerobic generation of adenosine triphosphate was impaired. The degree of enzyme release did not show a clear inverse relationship to the molecular wt. of the enzyme. High molecular wt. ribosomal RNA was released into the medium, but DNA and low molecular wt. RNA were not. Addition of glucose prevented enzyme release. Enzyme release was not the result of cellular lysis. Under aerobic conditions, the release of lactate dehydrogenase into the medium was substantially less in cultures of benign cell lines (hamster embryonic cells) than in cultures of neoplastic cells (Strain L, HeLa or KB cells); enzyme release in cultures of L cells was less than in the cultures of carcinoma cells.

69-2976 ULTRASTRUCTURE OF HUMAN CHORIOCARCINOMA. (E.) Knoth, M. (Aarhus U., Denmark) H. Hesseldahl and J. F. Larsen. Acta Obstet. Gynec. Scand. 48(1):100-118, 1969.

Several hamster transplants of a human choriocarcinoma, and 1/2 human choriocarcinomas examined, consisted of 2 cell types: cytotrophoblasts (larger than the corresponding cells of the normal placenta, and containing large, irregular mitochondria with few cristae), and syncytiotrophoblasts (resembling the corresponding normal cells, except for their large, irregular nuclei). Another human choriocarcinoma consisted only of cytotrophoblast-like cells. Endoplasmic reticulum was abundant in the syncytiotrophoblasts and sparse in the cytotrophoblasts, suggesting that human chorionic gonadotropin (which may have been represented by fine granular material of medium electron density, sometimes enclosed within a membrane) was produced by the syncytiotrophoblasts. No virus-like particles or crystals were seen. However, some cells showed intranuclear inclusions of Type II or IV (Bouteille classification), and it is noted that Type IV inclusions are seen in some virus diseases (including SV40 and polyoma virus infections), as well as in some diseases not known to be of viral etiology (including some brain tumors).

69-2977 TISSUE CULTURE OF HUMAN GLIOMAS. (E.) Kersting, G. (U. Bonn, Germany). Progr. Neurol. Surg. 2:165-202, 1968.

Proliferative rates of 2000 tissue cultures of primary or metastatic nervous system tumors varied from 1 tumor type to another, but did not correspond to the in vivo growth rates of the tumors. It was not possible to predict the degree of malignancy of an individual tumor from its in vitro growth rate. Dedifferentiation of the neuroectodermal tumors (except for the highly anaplastic glioblastomas) at either the tissue or cellular level was rare. An important difference was seen between cultures of human glioblastoma multiforme (80-120 cultures were obtained from a single tumor) and cultures of experimental gliomas (induced by intracerebral implantation of carcinogens in mice). Cultures from the same human glioma were identical, showing all of the widely different cellular structures of the original tumor, irrespective of the regions from which the explants were obtained. The results suggested that experimental gliomas develop from primary proliferation of heterologous elements adjacent to the area of carcinogen implantation, whereas spontaneous gliomas in man develop from a majority of homologous cellular elements in a certain area of influence. A comparison of these tumor cultures with cultures of normal animal or human brain tissue, provided no evidence to support the theory that neuroectodermal tissues are of dysembryogenetic origin. The absence of any signs of neuronal or glial differentiation in cultures of cerebellar medulloblastoma, led to the suggestion that this tumor is an inborn sarcoma of childhood, not a neuroectodermal tumor or a tumor belonging to the retinoblastoma-sympathicoblastoma group.

69-2978 GIANT CELL TUMORS OF BONE. (Fr.) Merle D'Augibné, R. and J.-M. Thomine. Rev. Prat. (Paris) 19(14):2163-2174, 1969.

A group of 39 pts. (22 females, 17 males) with giant cell tumors of the bones is described. The majority of pts. were in the 20-40 yr. age group; no pts. under 10 or over 60 were seen. The female preponderance was especially marked in the 20-30 yr. age group. About 15% of all giant cell tumors will grow like malignant tumors at some time, but only 5% are clinically malignant from the time of onset. Malignant transformation to giant cell sarcomas (in an estimated 10-15% of cases) is usually seen when recurrences develop (about 50% of tumors treated by curettage will recur over 5 yr.), and can be caused by radiotherapy. About 33% of the pt. group (most of them under 30, with a 2:1 female preponderance) showed clinically aggressive tumors with a rapid growth rate; all of the clinically malignant tumors were seen in this group. The number of pts. showing malignant transformation is not stated.

69-2979 CHONDROMAS--CHONDROBLASTOMAS--CHONDROMYXOID FIBROMAS. (Fr.) Monat, Y. and R. Meary. Rev. Prat. (Paris) 19(14):2177-2184, 1969.

The epidemiology, pathology and clinical behavior of the chondromas (about 5% of all primary bone tumors), chondroblastomas (about 1% of all primary bone tumors) and the chondromyxoid fibromas (slightly less frequent than the chondroblastomas) are discussed. These tumors are usually benign but can undergo malignant transformation to chondrosarcomas with a relatively high frequency (unspecified).

69-2980 CHONDROSARCOMAS. (Fr.) Roger, A. and R. Meary. Rev. Prat. (Paris) 19(16): 2415-2422, 1969.

Chondrosarcomas of bone (about 13% of all primary malignant bone tumors in 1 series) can be primary malignant tumors, or they can result from malignant degeneration of any of the benign tumors of the cartilage. Malignant transformation is more frequent in pts. with multiple exostoses (1 case in 7) or echondromatoses (1 case in 3) than in pts. with solitary chondromas or osteogenic exostoses. Malignant transformation of cartilaginous bone tumors is very rare in pts. under 20.

69-2981 EFFECT OF 1,2,5,6-TETRAMETHANESULFONYL-D-MANNITOL (R-52) ON THE CHROMOSOMES OF HUMAN LEUCOCYTE CULTURES. (E.) Schuler, D. (U. Med. Sch., Budapest) and G. Gács. Acta Morph. Acad. Sci. Hung. 16(4):463-468, 1968.

Peripheral WBC from normal children, children with acute lymphoblastic leukemia, and children with Fanconi's anemia (associated with a high frequency of leukemia) in 72-hr. cultures were exposed to 1,2,5,6-tetramethanesulfonyl-D-mannitol (R-52; 0.1-1.0 μg/ml). The R-52 conc. inhibiting mitosis by 50% in normal WBC and WBC from pts. with Fanconi's anemia were 0.75 and 0.5 μg/ml, resp. The spontaneous fragility of the chromosomes in Fanconi's anemia was demonstrated by the high frequency of breaks in untreated cultures (28%), although no translocations were noted. After exposure to the R-52 conc. inhibiting mitosis by 50%, the cells from children with Fanconi's anemia showed chromosomal breaks and translocations in 84% and 14% of the cells, compared to only 19% and 8%, resp., in normal cells exposed to equivalent conc. of R-52. In leukemic WBC, R-52 caused 100% inhibition of mitosis at 0.1 μg/ml.

See also abstract nos.: 2748,2965

AUTHOR INDEX

Aaronson, S. A. 2831
Achong, B. G. 2901
Agthe, C. 2791
Ahmad-Zadeh, C. 2838
Akao, M. 2803
Albert, H. 2769
Aldrich, C. D. 2837
Aleksandrowicz, J. 2730
Allcroft, R. 2793
Allen, D. W. 2820
Alvarez, Y. 2841,2842,2843, 2897
Amadori, D. 2946
Ambrose, E. J. 2956
Andelman, S. 2932
Araki, M. 2782
Arcos, J. C. 2742,2806
Argus, M. F. 2742
Aries, V. 2809
Ashley, D. J. B. 2924,2925
Atkin, N. B. 2974

Baikie, A. G. 2962
Baker, B. L. 2814
Balducci, D. 2853
Bariéty, M. 2931
Bartus, B. 2808
Bauer, H. 2874
Becker, Y. 2888
Bender, E. 2879
Benjamin, T. 2887
Bennett, J. M. 2753
Benyesh-Melnick, M. 2861,2910
Berard, C. W. 2753
Berdon, W. 2762
Berman, L. 2866,2913
Bernard, C. 2832
Best, P. V. 2899
Betlejewski, S. 2951
Bieberfeld, P. 2867
Bierwolf, D. 2879
Biggs, P. M. 2901
Biryulina, T. I. 2875,2876
Biswal, N. 2861
Bjarnason, O. 2942
Blair, D. 2899
Boiron, M. 2832,2870,2871
Bojan, O. 2804
Bösenberg, H. 2755
Botstein, D. 2774
Boucher, M. 2832
Bourdin, J. S. 2971
Boutet, M. 2966
Brandt, L. 2958
Brasfield, R. D. 2745
Brennan, K. 2853
Bresnick, E. 2797
Browning, L. S. 2773
Bruck, W. E. 2766
Buder, E. 2758
Burkitt, D. P. 2926
Burns, E. R. 2747

Callender, J. 2847,2886
Canivet, M. 2871
Capronnier, C. 2931
Carbone, P. P. 2753
Carnow, B. 2932
Carp, R. I. 2885
Carter, R. L. 2798
Casto, B. 2893
Cerny, E. A. 2796
Chen, T. T. 2811
Chernay, P. R. 2973
Chesterman, F. C. 2873
Chigot, P.-L. 2935
Chiricută, I. 2804
Chuat, J. C. 2866
Chubb, R. C. 2902
Churchill, A. E. 2901,2902
Clarke, C. H. 2775
Clifford, P. 2927
Cohen, M. H. 2753
Cole, F. H. 2768
Conde-Otero, F. 2921
Connon, A. F. 2944
Cordero De Pratt, D. C. 2941
Costanzo, G. 2833
Crawford, L. V. 2855
Crowther, J. S. 2809
Cutler, S. J. 2923

Dale, E. 2779
Dalhamn, T. 2787
Das, B. R. 2928
Das, P. K. 2928
Dasgupta, T. K. 2745
Datta, S. P. 2950
de Kohler, G. B. 2939
Delassus, M. 2790
De Lizardi Calderon, E. 2954
Demissie, A. 2852
Denborough, M. A. 2744
De Ratuld, Y. 2881
Dick, V. S. 2938
DiGeorge, A. M. 2963
Di Mayorca, G. 2847,2886
Doerfler, W. 2914
Döhner, L. 2915
Donahoo, J. S. 2949
Downing, H. J. 2744
Drasar, B. S. 2809
Dulbecco, R. 2750
Duplan, J. F. 2759

Easty, G. C. 2956
Ebert, J. D. 2835
Eckhart, W. 2846
Egawa, J. 2972
Einhorn, M. 2973
Ellison, M. L. 2956
Epstein, M. A. 2901
Epstein, S. M. 2808
Enden, J. A. 2760
Erikson, R. L. 2821
Espmark, J. 2911
Estola, T. 2877
Eyquem, A. 2971

Fabian, J. A. 2806
Farber, E. 2808
Fenyö, E. 2867
Ferguson, J. 2962
Fermepin, G. H. 2939
Figueroa, M. E. 2906,2907
Fischinger, P. J. 2868
Flanagan, J. C. 2963
Fogel, M. 2883
Fondarai, J. 2848
Foster, D. O. 2849
Fujinaga, K. 2856,2884
Furuja, T. 2802
Füzy, M. 2757

Gabay, P. 2971
Gács, G. 2981
Gaidar, E. I. 2912
Galibert, F. 2860
Galich, R. 2929
Garcia Gancedo, P. 2818
García-Gutierrez, A. 2921
Garson, O. M. 2962
Gatti, P. 2853
Gay Prieto, J. 2818
Gellin, G. A. 2732
Georgsson, G. 2816
Gerami, S. 2768
Gerber, P. 2753
German, J. 2964
Gimbo, A. 2833
Giordano, R. 2847,2886
Giorgi, R. 2790
Giovanardi, A. 2909
Glover, E. L. 2780
Goarin, P. 2790
Golcher, L. G. 2945
Goldblum, N. 2888
Goldie, W. 2936
Goldman, B. 2955
Gomez-Barry, H. 2921
González, G. 2818
Gosch, H. H. 2806
Graffi, A. 2758,2879,2900
Graffi, I. 2879
Graham, C. E. 2815
Graham, J. 2969
Graham, R. 2969
Green, M. 2856,2884
Gregor, O. 2922
Grieshaber, E. 2824
Grizzard, M. 2861
Grollman, S. 2780
Guillon, J. C. 2830
Gupta, S. 2950

Haas, R. 2890
Hakama, M. 2948
Halle-Pannenko, O. 2826
Hamburg, V. 2898
Haran-Ghera, N. 2822,2823
Harris, H. H. 2760
Harris, R. J. C. 2873
Hashimoto, Y. 2829
Hattori, H. 2953
Hay, R. J. 2835
Hedman, B. 2920
Heidelberger, C. 2811
Henle, W. 2911
Hervy, T. 2951
Herzberg, M. 2838
Hesseldahl, H. 2976
Hill, M. J. 2809
Hiraki, K. 2828
Hirschhorn, K. 2748
Hoelzl Wallach, D. F. 2756
Hollinshead, A. C. 2892
Horikawa, M. 2783
Horiuchi, S. 2802
Horn, K. H. 2879
Hoskins, J. M. 2844,2845
Horváth, É. 2777
Huppert, J. 2862
Hutterer, F. 2805

Ieb, Q. S. 2953
Ikeda, Y. 2802
Indira, O. C. 2950
Inoue, T. 2829
Issa, H. 2752

Jagiello, G. 2776
Jandová, A. 2940
Jensson, Ó. 2942
Johnson, J. G. 2967
Joklik, W. K. 2909
Jones, E. W. 2774
Josey, W. E. 2905

Kahn, R. H. 2814
Kakunaga, T. 2784
Kalter, S. S. 2878
Kamahora, J. 2784
Kanamaru, R. 2975
Karazas, N. 2875
Karika, Z. 2757
Kasparek, K. 2970
Kato, T. 2953
Katzman, H. 2762
Kawamura, Y. 2854
Kawazoe, Y. 2782
Keast, D. 2740
Keller, H.-P. 2749
Kendall, T. E. 2765
Kersting, G. 2977
Khoury, G. 2895
Kim, C. S. 2878
Kimura, I. 2829
Kisch, A. L. 2850
Kisia, I. A. 2926
Kit, S. 2741,2882
Kitajima, K. 2828
Klein, E. 2866,2867
Klein, G. 2911
Klein, H. J. 2970
Klimanskii, V. A. 2930
Klion, F. M. 2805
Knoth, M. 2976
Kobayashi, K. 2802
Kohgo, K. 2802
Koller, P. C. 2813
Korzis, J. 2801
Kosenow, W. 2961
Kothe, W. 2769
Kovács, K. 2777
Kozłowska, A. 2968
Kroh, H. 2817
Krompotic, E. 2973
Kryukova, I. N. 2876
Kukaine, R. A. 2869
Kuntzman, R. 2795
Kuroda, K. 2803
Kutinová, L. 2840

Lampert, F. 2960
Lampkin, B. C. 2754
Lance, P. 2728
Larsen, J. F. 2976
Lasneret, J. 2832,2870
Lauslahti, K. 2947
Laver, W. G. 2917
Lee, K. P. 2851
Lehrer, L. 2932
Lepper, M. H. 2932
Levin, W. 2795
Lherisson, A. M. 2848
Lienhard, C. P. 2939
Lijinsky, W. 2791
Lille-Szyszkowicz, I. 2971
Liozner, A. L. 2859
Lissenko, N. I. 2912
Lloyd, M. K. 2793
Löffler, H. 2751

Maass, G. 2890
Madsen, P. O. 2733
Magnusson, P. 2911
Mak, S. 2884
Maldague, P. 2759
Marchegiani, M. 2819
Marin, G. 2847,2886
Martuzzi, M. 2946
Martyré, M.-C. 2826
Masters, F. W. 2765
Matras, H. 2789
Mauch, P. J. 2763
Mauer, A. M. 2754
Mayer, A. M. 2792
McClelland, R. 2873
McCombs, R. M. 2861
McLean, A. E. M. 2799
McSwain, B. 2949
Meary, R. 2979,2980
Mellors, R. C. 2743
Melnick, J. L. 2906,2907
Merle D'Augibné, R. 2978
Méry, A.-M. 2830
Meyer, G. 2848
Meyer, J. S. 2959
Meyer-Bertenrath, J. G. 2737
Miluničová, A. 2940
Mironescu, St. 2800
Mirvish, S. S. 2739
Miyaki, K. 2803
Mkheidze, D. M. 2859
Modan, B. 2955
Modan, M. 2955
Moggian, G. 2946
Moloney, J. B. 2868
Monat, Y. 2979
Monjour, G. 2790
Morawetz, F. 2933
Mossé, H. 2797
Mustea, I. 2804

Nagao, T. 2828
Nagayama, R. 2953
Nagayeva, L. I. 2869
Nahmias, A. J. 2905
Naib, Z. M. 2905
Naji, A. F. 2766
Nakahara, W. 2782
Nikaido, O. 2783
Nishizuka, Y. 2735
Nowotny, K. 2769
Nusbacher, J. 2748

Oboshi, S. 2827
Obuch, I. B. 2876
O'Connor, T. E. 2868
Odaka, T. 2825
Ohtsuka, Y. 2794
Oleinik, G. I. 2912
Olson, C. 2851
Oremus, D. 2791
Otto, H. 2767
Oxford, J. S. 2844,2845

Paccaud, M. F. 2838
Paglia, M. A. 2745
Pai, S. R. 2801
Pardee, A. B. 2849
Parrilla, L. A. 2939
Pasternak, G. 2864
Pedio, G. 2824
Peled, A. 2823
Peraino, C. 2796
Percival, W. H. 2798
Pereira, G., 2941
Pereira, H. G. 2917
Peries, J. 2871
Peterson, H.-I. 2812
Pfeiffer, R. A. 2961
Philipson, L. 2916
Piña, M. 2856
Pintado, T. 2842,2843,2897

odliachouk, L. 2971
ohjanpelto, P. 2903
olani, P. E. 2776
oletti, A. 2819
olijakoff-Mayber, A. 2792
opper, H. 2805
orteous, I. B. 2899
ossick, P. A. 2732
ostlethwaite, R. 2899
otter, C. W. 2844,2845
rada, C. 2941
rage, L. 2916
resno-Albarrán, J. A. 2921
rice, C. H. G. 2936
ristasova, S. 2863
roenca, M. 2830
rusova, F. 2922
uri, R. K. 2950

uenum, C. 2790

abotti, G. F. 2834
ahman, Y. E. 2796
app, F. 2858
atner, I. A. 2878
avid, Z. 2888
awls, W. E. 2906,2907
egamey, R. H. 2838
enner, D. 2766
euber, M. D. 2780
evzis, M. G. 2930
ezáčová, D. 2840
iggs, J. L. 2837
itzl, F. 2970
oberts, B. A. 2793
obertson, D. F. 2764
obinson, D. W. 2765
obinson, J. B. D. 2927
obinson, P. 2792
odriguez Suarez, F. J. 2954
oe, F. J. C. 2736,2798
oger, A. 2980
omero De Pacheco, L. 2941
osenbergova, M. 2862,2863
ouse, H. 2857
oux, H. 2746
ubin, B. A. 2918
uiter, M. 2965
ullière, R. 2931
ussell, W. C. 2917
üttner, J. R. 2824
ylander, R. 2788

abin, A. B. 2904
andelin, K. 2877
aracino, R. T. 2971
aunders, E. F. 2754
avino, A. 2738,2785,2786
cassellati Sforzolini, G.
2785,2786
chaffner, F. 2805
chicha, H. 2970

Schlesinger, R. W. 2857,2894
Schoental, R. 2807
Schramm, T. 2758,2879
Schuler, D. 2981
Scutchfield, F. D. 2779
Seemayer, N. 2891
Seman, G. 2830
Shani, M. 2955
Shekhter, A. I. 2930
Shevliagyn, V. 2875
Shimojo, H. 2839
Shioura, N. 2932
Shiroki, K. 2839
Silberman, S. 2973
Simu, G. 2804
Sinkovics, J. G. 2880
Škoda, V. 2940
Slowatizky, I. 2792
Smigla, K. 2968
Smith, C. J. 2810
Sokol, F. 2885
Spiers, A. S. D. 2962
Spiers, P. S. 2772
Spratt, J. S., Jr. 2957
Stoitchkov, Y. 2870
Stokinger, H. E. 2734
Stophanskaya, A. G. 2912
Strohl, W. A. 2857
Suga, Y. 2828
Sugahara, T. 2783
Svedmyr, A. 2852
Svet-Moldavsky, G. J. 2859,
2898
Svoboda, J. 2872,2908
Szabó, D. 2777

Tabarés, E. 2842,2843,2897
Tagaya, I. 2919
Takahashi, K. 2953
Takemori, N. 2837
Taube, A. 2920
Tauchnitz, C. 2749
Taupp, W. 2770
Terao, K. 2803
Thomas, C. 2816
Thomas, D. 2856
Thomas, M. 2870
Thomas, W. O., Jr. 2760
Thomine, J.-M. 2978
Thorarinsson, A. 2942
Thuilleux, G. 2935
Tikhonova, Z. 2875
Tison, M. J. 2806
Todaro, G. J. 2831
Toman, R. 2922
Tompkins, W. A. F. 2906,2907
Toury, J. 2790
Trifaud, A. 2746
Tripathi, V. N. P. 2938
Tsubura, Y. 2829
Tsuchiya, Y. 2919

Undeutsch, W. 2729

Urbańska-Bonenberg, L. 2968
Uy, E. S. 2973

Valentine, R. C. 2917
Valette, R. 2790
Valladares, Y. 2841,2842,2843,
2897
Van Bruggen, E. F. J. 2836
Van Der Eb, A. J. 2836
Van Der Noordaa, J. 2896
Van Kesteren, L. W. 2836
Verschuuren, H. G. 2799
Veys, C. A. 2937
Vice, T. E. 2878
Vigliani, E. C. 2771
Viola, M. 2868
Violante, A. 2819
Vogel, H. H., Jr. 2761
Vonka, V. 2840
Von Kreybig, T. 2781

Wagenknecht, L. V. 2733
Wahren, B. 2865
Watkins, J. F. 2908
Watne, A. L. 2967
Waugh, T. 2762
Weisburger, E. K. 2801
Weisburger, J. H. 2801
Welte, W. 2934
Wengraf, A. 2805
Werchau, H. 2890
Werner, G. H. 2881
Wessel, W. 2816
Wetzel, R. 2758
Wheatley, D. N. 2778
Wilk, M. 2770
Williams, R. E. O. 2809
Willis, J. 2943
Wolf, H. 2733
Woods, D. A. 2810
Woods, J. 2943

Yamamoto, R. S. 2801
Yoshikawa-Fukada, M. 2835
Yuyama, S. 2835

Zamfir, Gh. 2731
Zatsepin, N. I. 2912
Závadová, H. 2840
Žemla, J. 2889
Ziegler, J. L. 2753
Zimmermann, B. 2967
Zimmermann, G. 2952

SUBJECT INDEX

ABNORMALITIES, CONGENITAL
  aniridia, Wilms' tumor: 2963
ACETAMIDE, THIO-
  toxicity, liver, mechanism, rat: 2800
2-ACETYLAMINOFLUORENE (See N-2-Fluorenylacetamide)
ADRENAL
  progesterone-corticosteroid conversion, effect of dimethylbenzanthracene, rat: 2779
  toxicity, benzanthracene derivatives, effect of amino acids, rat: 2778
    dimethylbenzanthracene, ultrastructure, rat: 2777
ADRENAL NEOPLASMS
  primary adrenocortical melanoma, pathogenesis, review: 2745
AFLATOXIN(S)
  analysis, milk, method: 2792
  content, African foods: 2790
  liver tumors, review: 2755
  metabolism, milk, cow: 2793
  toxicity, liver, duckling: 2790
AFLATOXIN B-1
  analysis, foods, method: 2791
  liver and kidney tumors, rat: 2808
AFLATOXIN G-1
  analysis, food, method: 2791
AGE
  breast cancer incidence changes ("Clemmesen's hook"), Scandinavia: 2948
  difference, methylcholanthrene thyroiditis, rat: 2780
AIR POLLUTION
  cigarette smoke, measurement: 2786
  lung and g.i. cancer, U.S., review: 2734
  potential carcinogens, WHO standards of permissible levels: 2771
  pulmonary defense mechanisms, guinea pig: 2788
  respiratory diseases (including cancer), Illinois (Chicago): 2932
ALCOHOL
  consumption, esophagus cancer, Kenya (Western Nyanza region): 2926
ALKYLATING AGENTS (See under Antitumor agents)
AMINES, AROMATIC
  metabolism, bladder cancer, review: 2733
AMINO ACIDS
  arginine, deficiency, effect on SV40 replication and antigens: 2888
  effect on adrenal toxicity of benzanthracene derivatives, rat: 2778
  transport, polyoma virus-transformed cells: 2849
ANTIMONY
  analysis, human tumors: 2970
ANTITUMOR AGENTS
  actinomycin D, effect on SV40 DNA replication and transcription: 2885
  alkanesulfonates or nitrogen mustards, s.c. tumors and effect on chromosomes, rat or mouse: 2813
  alkylating agents, teratogenesis, rat: 2781
ANTITUMOR AGENTS (contd)
  halogenated pyrimidines, effect on thymidine kinase induction, polyoma virus-infected mouse embryo cells: 2889
ARSENIC
  occupational exposure, skin cancer, review: 2731
ARYLAMINES, CONJUGATED
  structure-activity relationships, review: 2742
ASBESTOS
  occupational exposure, lung cancer, review: 2731
AUTOIMMUNITY (See under Immunity disorders)
AZO DYES
  Ponceau MX (food coloring), liver tumors, mouse: 2802
  structure-activity relationships, review: 2742
AZOBENZENE, 4-DIMETHYLAMINO-
  hepatoma, rat: 2803,2804
  liver metabolism, effect of bacteriostatic agents, rat: 2803
AZOBENZENE, 2-METHYL-4-DIMETHYLAMINO-
  effect on mitochondrial membrane electron transport and respiration, rat: 2806
AZOBENZENE, 3'-METHYL-4-DIMETHYLAMINO-
  liver tumors, mitochondrial membrane electron transport and respiration, rat: 2806
  toxicity, liver, ultrastructure, rat: 2805

BACTERIA
  intestinal, diet-related carcinogen production, g.i. cancer epidemiology: 2809
BACTERIOSTATIC AGENTS
  effect on dimethylaminoazobenzene liver metabolism and liver tumors, rat: 2803
BENZANTHRACENE, 1:2,5:6-DI-
  preneoplastic brain tumors, virus-like particles, mouse: 2854
BENZANTHRACENE, 7,12-DIMETHYL-
  adrenal toxicity, rat: 2777,2778
  cheek pouch tumors, ultrastructure, hamster: 2810
  effect on adrenal progesterone-corticosteroid conversion, rat: 2779
  leukemia, host genetics (mouse) and species differences (rat and mouse), review: 2735
  s.c. tumors, effect of adenovirus type 16, hamster: 2898
BENZANTHRACENE, 7-HYDROXYMETHYL-12-METHYL-
  adrenal toxicity, effect of amino acids, rat: 2778
BENZANTHRACENE DERIVATIVES
  transformation, mouse prostate cultures, and skin tumor-initiating activity: 2811
3,4-BENZPYRENE
  transformation, mouse prostate cultures, and skin tumor-initiating activity: 2811
BERYLLIUM
  occupational exposure, lung cancer, review 2731
BLADDER CARCINOGENESIS
  animals and man, review: 2733

ADDER CARCINOGENESIS (contd)
  β-naphthylamine, rubber factory, England (Birmingham): 2937
ADDER NEOPLASMS
  epidemiology, cattle and human, review: 2733
  sarcoma frequency, cases and review: 2938
OOD
  coagulation, fibrinolysis and tumor growth, mouse: 2812
OOD GROUPS
  ABH secretion,
    breast and female genital cancer, Argentina (Buenos Aires): 2939
    female genital cancer, Czechoslovakia (Prague): 2940
    stomach cancer, review: 2744
  ABO
    breast and female genital cancer, Argentina (Buenos Aires): 2939
    female genital cancer, Czechoslovakia (Prague): 2940
    stomach cancer, review: 2744
  Rh factor, breast and female genital cancer, Argentina (Buenos Aires): 2929
NE NEOPLASMS
  benign, cartilaginous or chondroma types, malignant transformation: 2979,2980
  epidemiology, children, West Germany (Rheinland-Westfalen): 2934
  giant cell tumor, frequency of malignant transformation: 2978
  osteogenic sarcoma, epidemiology, France (Paris): 2935
  Paget's sarcoma, epidemiology, England (Leeds and Bristol): 2936
  pseudotumoral diseases, review: 2746
  radiation-induced, child: 2762
  traumatic and other osteoma, review: 2728
RON
  soil, nasopharynx cancer, Kenya: 2927
AIN
  progressive cerebellar ataxia (Louis-Bar syndrome), acute leukemia, siblings, family cancer history: 2960
AIN NEOPLASMS
  (See also under Nervous system neoplasms)
  glioma, pathogenesis, tissue culture: 2977
  oligodendroglioma (Grade II), trace element levels: 2970
  polyoma-induced, growth and regression, rabbit: 2899
  premalignant, methylcholanthrene-induced, pathology and enzymes, mouse: 2817
      virus-like particles, mouse: 2854
  primary meningeal melanoma, pathogenesis, review: 2745
EAST NEOPLASMS
  (See under Mammary neoplasms, human)
OMINE
  analysis, human tumors: 2970
ONCHUS
  ciliostasis, cigarette smoke, effect of filtration and oxolamine citrate, cat: 2787
ONCHUS NEOPLASMS
  epidemiology, methods: 2931
  trace element levels: 2970

BUTANE, 1,2,3,4-DIEPOXY-,
  mutagenesis, bacteria: 2775
γ-BUTYROLACTONE (solvent),
  jaw and testis tumors, rat: 2807

CARCINOGENESIS, CHEMICAL
  industrial epoxy resin hardener and solvent, rat: 2807
  polycyclic aromatic hydrocarbons and conjugated arylamines, structure-activity relationships, review: 2742
  skin of hand: 2765
CAPCINOGENS, CHEMICAL
  air pollution, WHO standards of permissible levels: 2771
  diet-related production by intestinal bacteria, colon-rectum cancer epidemiology: 2809
  environmental pollution, U.S., review: 2734
  foods, review: 2736
  formation from endogenous cholesterol: 2770
CELL GROWTH KINETICS
  cell membrane changes, review: 2756
  human glioma, tissue culture: 2977
  leukemia, review: 2754
  medullary and extramedullary hematopoiesis, chronic myeloid leukemia: 2958
  mouth tumors: 2959
  self-inhibition phenomenon, review: 2747
  SV40-infected monkey kidney cells, viral DNA synthesis: 2890
CERVIX UTERI NEOPLASMS
  epidemiology
    Australia (Woodville): 2944
  Costa Rica (San José): 2941
    Iceland: 2942
    Italy (Forli Province): 2946
    Northern Ireland (Belfast): 2943
  genital herpesvirus (Type 2) infection: 2905,2906,2907
  induction, methylcholanthrene, pathogenesis, mouse: 2815
  perimodal variations of DNA content: 2974
  premalignant dysplasia, epidemiology, Mexico: 2945
CHLORIDES
  analysis, human tumors: 2970
CHORIOCARCINOMA
  (See under Corpus uteri neoplasms)
CHROMATES
  occupational exposure, lung cancer, review: 2731
CHROMOSOMES
  abnormalities, alkylating agent-induced s.c. tumors, rat or mouse: 2813
  adenovirus-infected human embryo fibroblasts: 2912
  autosomal anomalies and cancer, familial, cases and review: 2748
  clonal evolution, erythromyelosis (Di Guglielmo type): 2973
  familial leukemia, parents and children: 2962
  fragility, Fanconi's anemia, children: 2981

- CHROMOSOMES (contd)
  - genetic transcription, effect of methylcholanthrene, rat liver: 2797
  - meiosis, effect of LSD, mouse germ cells: 2776
  - sex, benign or malignant ovary tumors: 2972
- COCARCINOGENESIS
  - mechanism, review: 2737
- COLON
  - familial polyposis, malignant transformation, Gardner's syndrome: 2967
- COLON NEOPLASMS
  - frequency, Gardner's syndrome (familial soft tissue masses, bony tumors and colon polyposis): 2967
- COPPER
  - soil, nasopharynx cancer, Kenya: 2927
- CORPUS UTERI NEOPLASMS
  - choriocarcinoma, epidemiology, Finland: 2947
    - ultrastructure: 2976
  - epidemiology, Italy (Forli Province): 2946
  - radiation-induced, human: 2760
- CROTON OIL
  - phorbol esters, cocarcinogenesis, mechanism, review: 2737

- DIETARY FACTORS
  - (See also under Foods)
  - calorie and protein levels, g.i. cancer, U.S. and Czechoslovakia: 2922
  - carcinogen production by intestinal bacteria, g.i. cancer epidemiology: 2809
  - magnesium deficiency, leukemia endemic area, Poland, review: 2730
  - protein deprivation, effect on dimethylnitrosamine liver toxicity, rat: 2799
- DIMETHYL SULFOXIDE
  - effect on polyoma virus transformation, hamster cells: 2850
- DIPHENYLMETHANE, 4,4'-DIAMINO-(industrial epoxy resin hardener)
  - liver, kidney, mammary and pituitary tumors, rat: 2807

- ENVIRONMENTAL FACTORS
  - geographical variation of Hodgkin's disease, wood workers, U.S.: 2772
- ENZYMES
  - acid phosphatase, carcinogen effects, rat liver: 2796
  - cytoplasmic, release into medium, normal or malignant cell cultures: 2975
  - metabolism, viral carcinogenesis, review: 2741
  - methylcholanthrene-induced premalignant brain tumors, mouse: 2817
  - oxidative, viral papilloma, calf: 2851
  - RNA-associated nuclease, avian myeloblastosis or parainfluenza virus: 2863
  - RNase, carcinogen effects, rat liver: 2796
  - thymidine kinase, induction, effect of antimetabolites, polyoma virus-infected mouse embryo cells: 2889
- EPIDEMIOLOGY
  - benign and malignant head/neck tumors, children, Poland (Gdańsk): 2951
  - bladder tumors, β-naphthylamine exposure, rubber factory, England (Birmingham): 2937
  - breast cancer
    - ABO and Rh blood groups, Argentina (Buenos Aires): 2939
    - age changes ("Clemmesen's hook"), Scandinavia: 2948
    - Tennessee (Nashville): 2949
  - bronchus cancer, methods: 2931
  - bladder cancer, cattle and human, review: 2733
  - bone tumors, children, West Germany (Rheinland-Westfalen): 2934
  - bovine leukosis and human leukemia, soil pH and magnesium level, Poland, review: 2730
  - Burkitt lymphoma
    - Africa and U.S., review: 2753
    - Kenya (western): 2926
  - calculation or relative risk, mathematical models: 2920
  - cervix cancer
    - Australia (Woodville): 2944
    - Costa Rica (San José): 2941
    - genital herpes (Type 2) infection: 2905,2906,2907
    - Iceland: 2942
    - Northern Ireland (Belfast): 2943
    - Italy (Forli Province): 2946
    - choriocarcinoma and related diseases, Finland: 2947
  - colon-rectum cancer
    - carcinogen production by intestinal bacteria, England and Uganda: 2809
    - dietary factors, U.S. and Czechoslovakia: 2922
  - esophagus cancer, Wales, ethnic groups (Welsh and non-Welsh), sex difference: 292
  - eye tumors, Japan: 2953
  - female genital cancer
    - blood groups, Argentina (Buenos Aires): 2939
      - Czechoslovakia (Prague): 2940
    - Iceland: 2942
  - g.i. cancer
    - environmental pollution, U.S., review: 2734
    - Kenya (western): 2926
    - U.S.: 2923
  - Hodgkin's disease, occupational exposure to pine pollen, geographical variation, U.S.: 2772
  - larynx cancer, India (Assam): 2928
  - leukemia and malignant tumors, children, India (Pondicherry): 2950
  - lung cancer
    - occupational mineral exposure, review: 2731
    - Tennessee (Memphis), pulmonary TB and smoking: 2768
  - lymphoma, Israel, ethnic groups: 2955
  - malignant pleural effusions, Austria (Vienna): 2933
  - multiple primary tumors (4 sites), case: 2952

PIDEMIOLOGY (contd)
- muscular tumors of stomach, Cuba (Havana): 2921
- nasopharynx cancer
  - Mexico City: 2954
  - trace elements in soil, Kenya: 2927
- osteogenic sarcoma, France (Paris): 2935
- premalignant and benign breast tumors, Tennessee (Nashville): 2949
  - dysplasia of cervix, Mexico: 2945
- Paget's bone sarcoma, England (Leeds and Bristol): 2936
- primary lung tumors of rare types, children, USSR (Moscow): 2930
  - melanoma of unusual sites, review: 2745
- respiratory cancer
  - Illinois (Chicago), air pollution and socioeconomic status: 2932
  - U.S., environmental pollution, review: 2734
- salivary gland tumors, children, Washington (Seattle): 2929
- serum Epstein-Barr virus antibodies, women, Sweden (Eskilstuna): 2852
- skin cancer
  - occupational arsenic exposure, review: 2731
    - review: 2732
- stomach cancer
  - ABO blood groups and ABH secretion, review: 2744
  - dietary factors, U.S. and Czechoslovakia: 2922
  - from stomach ulcer, East Germany (Leipzig): 2769
  - Wales, ethnic groups (Welsh and non-Welsh): 2925
- urogenital sarcomas, frequency, cases and reivew: 2938
- uterus cancer, Italy (Forli Province): 2946

PSTEIN-BARR VIRUS
- (See under Virus, herpes-type)

SOPHAGUS NEOPLASMS
- epidemiology
  - Kenya (western), alcohol consumption: 2926
  - Wales, ethnic groups (Welsh and non-Welsh), sex difference: 2924

THNIC GROUPS
- malignant lymphoma, Israel: 2955
- socioeconomic status, respiratory diseases including cancer, Illinois (Chicago), air pollution: 2932
- Wales (Welsh and non-Welsh), esophagus cancer, sex difference: 2924
  - stomach cancer: 2925

YE
- abnormalities (aniridia), Wilms' tumor: 2963

YE NEOPLASMS
- epidemiology, Japan: 2953

-2-FLUORENYLACETAMIDE
- effect on liver RNase and acid phosphatase, rat: 2796

N-2-FLUORENYLACETAMIDE, N-HYDROXY-
- liver tumors, effect of mammotropic pituitary tumor, rat: 2801

FOODS (See also under Dietary factors)
- aflatoxin
  - analysis, method: 2791
    - milk: 2792
  - contents, Africa: 2790
  - excretion in milk, cow: 2793
- carcinogen screening, review: 2736
- coloring (Ponceau MX), liver tumors, mouse: 2802
- pollution, lung and g.i. cancer, U.S., review: 2734
- trace elements, nasopharynx cancer, Kenya: 2927

GASTROINTESTINAL DISEASES
- hypertrophic gastropathy (Menetrier's disease), malignant transformation: 2968
- stomach ulcer, stomach cancer frequency, East Germany (Leipzig): 2769

GASTROINTESTINAL NEOPLASMS
- epidemiology, U.S.: 2923
- primary melanoma, pathogenesis, review: 2745

GASTROINTESTINAL TRACT
- bacteria, diet-related carcinogen production, g.i. cancer epidemiology: 2809

GENETICS, ANIMAL
- Friend leukemia virus susceptibility, mouse strains: 2825
- NZB mouse strain, role of leukemia virus in autoimmunity-lymphoma syndrome, review: 2743
- viral and chemical leukemogenesis, mouse, review: 2735

GENETICS, HUMAN
- autosomal anomalies and cancer, cases and review: 2748
- Bloom's syndrome (congenital telangiectatic erythema with growth retardation), leukemia or cancer frequency: 2964
- epidermodysplasia verruciformis, malignant transformation, possible role of virus: 2965
- familial leukemia (parents and children), chromosomes: 2962
- Fanconi's anemia, chromosomal fragility, children: 2981
- Gardner's syndrome (familial soft tissue masses, bony tumors and colon polyposis), colon cancer frequency: 2967
- identical twins with chronic myeloid leukemia, case (child) and review: 2961
- progressive cerebellar ataxia (Louis-Bar syndrome) and acute leukemia, siblings, family cancer history: 2960

GENETICS, MICROBIAL
- adenovirus 2-infected and transformed cells: 2884
- cancervirus (papovavirus) and SV40, transformed cells: 2842,2843
- classification of cyt kb mutants of adenovirus 12: 2837

- GENETICS, MICROBIAL (contd)
  - genome complementation, SV40 PARA-adenovirus hybrids: 2858
  - polyoma virus temperature-sensitive mutants, classification: 2846,2847
- GENETICS, POPULATION
  - esophagus cancer, Wales, sex difference: 2924
  - stomach cancer, Wales: 2925
  - susceptibility to environmental pollution, U.S., review: 2734
- GENITAL NEOPLASMS, FEMALE
  - epidemiology
    - Argentina (Buenos Aires), ABO and Rh blood groups: 2939
    - Czechoslovakia (Prague), ABO blood groups and ABH secretion: 2940
    - Iceland: 2942
  - primary melanoma, pathogenesis, review: 2745
  - tumor cell "antigen-shielding" substance: 2969
- GENITAL NEOPLASMS, MALE
  - sarcoma frequency, cases and review: 2938

- HALLUCINOGENS
  - LSD, effect on meiosis, mouse germ cells: 2776
- HEAD AND NECK NEOPLASMS
  - benign or malignant, children, Poland (Gdańsk): 2951
  - nose and paranasal sinus, epidemiology, Mexico City: 2954
- HEMATOPOIESIS
  - medullary and extramedullary, kinetics, chronic myeloid leukemia: 2958
- HORMONES
  - dependence, multiple primary tumors, case: 2952
  - norethynodrel, mammary tumors, mouse: 2814
  - pituitary, from mammotropic pituitary tumor, effect on hydroxyfluorenylacetamide liver tumor, rat: 2801
  - progesterone-corticosteroid conversion, effect of dimethylbenzanthracene, rat adrenal: 2779
- HYDROCARBONS, POLYCYCLIC AROMATIC
  - analysis, gas chromatography, methods and results, review: 2738
  - formation from endogenous cholesterol: 2770
  - structure-activity relationships, review: 2742
  - transformation of prostate cultures, and skin tumor-initiating activity, mouse: 2811

- IMMUNITY
  - adenovirus 12-induced mouse or hamster tumor, T antigen: 2913
  - adenovirus 31 antigens, properties: 2838
  - antigen-shielding substance, human tumor cells: 2969
  - avian myeloblastosis virus, group-specific antigen: 2820
  - chicken leukosis virus, flock of inbred chickens: 2877
- IMMUNITY (contd)
  - Friend virus, maternal-fetal antibody transmission, mouse: 2865
    - neoantigens, immunization, mouse: 2826
  - Harvey virus-induced tumor cells: 2866
  - human adenovirus T antigens, properties: 2892
  - Moloney virus-induced tumor cells: 2866,2867
  - polyoma virus tumors, radiation effects, hamster: 2848
  - Rauscher virus vaccine, effect on virus invasion of spleen, mouse: 2828
  - serum Epstein-Barr virus antibodies, women, Sweden (Eskilstuna): 2852
  - γ-globulin antibodies, human cancer: 2971
  - SV40
    - T antigen, transformed hamster cells: 2891
    - tumor antigens, effect of adenoviruses, hamster: 2844,2845
    - V and T antigens, effect of arginine deficiency in vitro: 2888
  - transplantation antigen, chemically induced virus-containing tumors, mouse: 2859
  - transplantation, induction by avian myeloblastosis virus, Rous virus sarcoma, mouse: 2874
  - viral and virus-induced antigens, RNA viruses (avian or mouse): 2864
- IMMUNITY DISORDERS
  - autoimmunity
    - possible precursor of malignant tumors, review: 2740
    - role of leukemia virus, NZB mice, review: 2743
- IMMUNOSUPPRESSION
  - anti-thymocyte serum or radiation, virus-induced mouse leukemia: 2823
  - Rous virus tumors, baboon: 2878
- INJURIES (See also under Scar tissue)
  - bone, osteoma, review: 2728
  - hand, skin cancer: 2765
  - occupational, skin cancer, review: 2732
  - soft tissues, tumor metastases to traumatized tissue, lung or breast cancer: 2766
- INTESTINE, LARGE, NEOPLASMS
  - dietary factors
    - carcinogen production by intestinal bacteria, England and Uganda: 2809
    - U.S. and Czechoslovakia: 2922
- IODIDES
  - analysis, human tumors: 2970
- IRON
  - analysis, human tumors: 2970
  - occupational exposure, lung cancer, review: 2731
  - soil, nasopharynx cancer, Kenya: 2927
- ISONICOTINIC ACID HYDRAZIDE
  - possible lung carcinogenesis, TB, smoking: 2768

- KIDNEY CARCINOGENESIS
  - aflatoxin, rat: 2808
  - radiation, effect of radioprotective agent, rat: 2759
- KIDNEY NEOPLASMS
  - sarcoma frequency, cases and review: 2938

IDNEY NEOPLASMS (contd)
  Wilms' tumor (nephroblastoma), aniridia: 2963

ARYNX NEOPLASMS
  epidemiology, India (Assam): 2928
  radiation-induced, child with papillomatosis of larynx: 2763
EAD
  soil, nasopharynx cancer, Kenya: 2927
EUKEMIA, EXPERIMENTAL
  hamster, virus, properties: 2879
EUKEMIA, HUMAN
  acute lymphatic, progressive cerebellar ataxia (Louis-Bar syndrome), siblings, family cancer history: 2960
  cell growth kinetics, review: 2754
  chronic myeloid
    identical twins, case (child) and review: 2961
    medullary and extramedullary cell growth kinetics: 2958
    mother and son, chromosomes: 2962
    Ph^1-positive, familial: 2748
  epidemiology, children, India (Pondicherry): 2950
    magnesium deficiency (diet and soil), Poland, review: 2730
  erythromyelosis (Di Guglielmo type), chromosomes: 2973
  familial congenital telangiectatic erythema and growth retardation (Bloom's syndrome): 2964
  high-risk disease (Fanconi's anemia), chromosomal fragility, children: 2981
  parents and children, chromosomes: 2962
EUKEMOGENESIS, EXPERIMENTAL (See also under Virus, leukemia/lymphoma)
  chemical and viral, host genetics, mouse, review: 2735
  urethan, mechanism, mouse, review: 2739
EUKOSIS, BOVINE
  epidemiology, magnesium deficiency (diet and soil), Poland, review: 2730
IVER
  genetic transcription, effect of methylcholanthrene, rat: 2797
  microsomal hemoprotein, effect of methylcholanthrene, rat: 2795
  RNase and acid phosphatase, effect of fluorenylacetamide, rat: 2796
  toxicity
    aflatoxin, duckling: 2790
    dimethylnitrosamine, effect of protein-free diet, rat: 2799
      mink: 2798
    methyldimethylaminoazobenzene, ultrastructure, rat: 2805
    thioacetamide, mechanism, rat: 2800
    tolylazonaphthylamine, mouse or rat: 2794
IVER CARCINOGENESIS
  aflatoxins, rat: 2808
    review: 2755
  azo dye food coloring (Ponceau MX), mouse: 2802

LIVER CARCINOGENESIS (contd)
  dimethylaminoazobenzene
    effect of bacteriostatic agents, rat: 2803
    hydroxyfluorenylacetamide, effect of mammotropic pituitary tumor, rat: 2801
    tumor classification, rat: 2804
  3'-methyl-4-dimethylaminoazobenzene, mitochondrial membrane electron transport and respiration, rat: 2806
LUNG
  defense mechanisms, effect of air pollutants or tobacco smoke, guinea pig: 2788
LUNG CARCINOGENESIS
  isoniazid, possible, pulmonary TB, smoking: 2768
  urethan, mechanism, mouse, review: 2739
LUNG DISEASES
  TB, lung cancer, smoking, Tennessee (Memphis): 2768
    scar, melanoma metastases: 2767
LUNG NEOPLASMS
  dissemination to traumatized soft tissues: 2766
  environmental pollution, U.S., review: 2734
  metastatic melanoma, TB scar: 2767
  occupational mineral exposure, review: 2731
  rare types, children, USSR (Moscow): 2930
  TB scars, smoking, Tennessee (Memphis): 2768
LYMPHOMA, MALIGNANT, EXPERIMENTAL (See also under Virus, leukemia-lymphoma)
  spontaneous, dog, enterovirus or mouse leukemia virus-like particles: 2830
LYMPHOMA, MALIGNANT, HUMAN
  Burkitt type
    cells, EB virus determination, method: 2911
      reovirus isolation: 2909
    epidemiology, Kenya (western): 2926
      serum virus antibodies, U.S., review: 2753
  epidemiology, Israel, ethnic groups: 2955
  Hodgkin's disease, occupational pine pollen exposure, geographical variation, U.S.: 2772
LYSERGIC ACID DIETHYLAMIDE (See under Hallucinogens)

MAGNESIUM
  deficiency, diet and soil, leukemia endemic area, Poland, review: 2730
MALIGNANT TRANSFORMATION
  benign cartilaginous tumors to chondrosarcoma of bone, frequency: 2979,2980
  giant cell tumor of bone to giant cell sarcoma, frequency: 2978
  hereditary epidermodysplasia verruciformis to bowenoid carcinoma of skin, possible role of virus: 2965
  hypertrophic gastropathy (Menetrier's disease) to carcinoma of stomach: 2968
  Paget's disease to bone sarcoma, frequency, England (Leeds and Bristol): 2936
  papillomatosis to carcinoma of larynx, radiation-induced, child: 2763
  pilonidal sinus to skin carcinoma, case and review: 2966

MALIGNANT TRANSFORMATION (contd)
- polyposis to cancer of the colon, Gardner's syndrome: 2967
- stomach ulcer to cancer, East Germany (Leipzig): 2769
- UV-irradiated rat or mouse embryonic cells: 2758

MAMMARY CARCINOGENESIS, EXPERIMENTAL (See also under Virus, mammary tumor)
- norethynodrel, mouse: 2814
- radiation, rat: 2761

MAMMARY NEOPLASMS, EXPERIMENTAL (See also under Virus, mammary tumor)
- spontaneous, enterovirus-like particles, dog: 2830
  - tumor growth and fibrinolysis, mouse: 2812

MAMMARY NEOPLASMS, HUMAN
- epidemiology
  - age changes ("Clemmesen's hook"), Scandinavia: 2948
  - Argentina (Buenos Aires), ABO and Rh blood groups: 2939
  - benign tumors and axillary metastases, Tennessee (Nashville): 2949
- metastases to traumatized soft tissues (oophorectomy scar): 2766

MANGANESE
- soil, nasopharynx cancer, Kenya: 2927

MAREK'S DISEASE VIRUS (See under Virus, herpes-type)

MERCURY
- analysis, human tumors: 2970

METABOLISM (glycolysis & respiration)
- effect of aminoazo dyes, rat liver mitochondria membranes: 2806

METALS
- occupational exposure, lung cancer, review: 2731
- trace, soil, nasopharynx cancer, Kenya: 2927

METALS, HEAVY
- air pollution, WHO standards of permissible levels: 2771
- trace elements, human tumors: 2970

3-METHYLCHOLANTHRENE
- cervix cancer, pathogenesis, mouse: 2815
- effect on
  - genetic transcription, rat liver chromatin: 2797
  - microsomal hemoprotein, rat liver: 2795
- preneoplastic brain tumors
  - pathology and enzyme patterns, mouse: 2817
  - virus-like particles, mouse: 2854
- s.c. sarcoma, tumor growth and fibrinolysis, mouse: 2812
- thyroiditis, age and sex difference, rat: 2780

MOLYBDENUM
- soil, nasopharynx cancer, Kenya: 2927

MOUTH NEOPLASMS
- pipe smoking, human: 2789
- premalignant hyperkeratosis, ultrastructure, human or hamster (dimethylbenzanthracene-induced): 2810
- tumor growth kinetics: 2959

MUTAGENESIS
- methylnitrosoguanidine, bacteria: 2774
  - _Drosophila_: 2773

MUTAGENESIS (contd)
- nitrosomethylurethan or diepoxybutane, bacteria: 2775

MYELOMA AND RELATED DISEASES
- HIPA mesenteric and ascites plasmacytoma, virus particles, mouse: 2824

2-NAPHTHOL-3,6-DISULFONIC ACID, 1-(2,4-XYLYLAZO)-, DISODIUM SALT (Ponceau MX; food coloring)
- liver tumors, mouse: 2802

β-NAPHTHYLAMINE
- bladder cancer, review: 2733
- nitrogen mustard derivative, s.c. tumors, rat and mouse: 2813
- occupational exposure, rubber factory, bladder cancer, England (Birmingham): 2937

NAPHTHYLAMINE, TOLYLAZO- (Oil Yellow OB)
- toxicity, liver, mouse or rat: 2794

NASOPHARYNX NEOPLASMS
- epidemiology, Mexico City: 2954
- trace elements in soil, Kenya: 2927

NEOPLASMS, EXPERIMENTAL,
- differentiation, effect of embryonic tissue, rat kidney tumor _in vitro_: 2956
- enzyme release into culture medium, criterion of malignancy: 2975
- role of autoimmunity, review: 2740
- self-inhibition of growth, review: 2747
- Yoshida ascites sarcoma (rat), evidence of viral etiology: 2833

NEOPLASMS, HUMAN
- cell membrane changes, review: 2756
- cellular antigen-shielding substance: 2969
- DNA virus, methods of determination: 2904
- epidemiology
  - calculation of relative risk, mathematical models: 2920
  - children, India (Pondicherry): 2950
- growth rates, method of calculation: 2957
- perimodal variations of DNA content: 2974
- primary melanoma of rare sites, pathogenesis, review: 2745
- serum γ-globulin antibodies: 2971
- viral etiology, review: 2749,2750,2751

NERVOUS SYSTEM NEOPLASMS (See also under Brain neoplasms)
- methylnitrosourea-induced, ultrastructure, rat: 2816

NICKEL
- occupational exposure, lung cancer, review: 2731
- soil, nasopharynx cancer, Kenya: 2927

NICOTINE (See also under Tobacco)
- analysis, cigarette smoke, method: 2785

NITROGEN MUSTARDS (See under Antitumor agents)

NITRO AND NITROSO COMPOUNDS
- structure-activity relationships, review: 2742

4-NITROQUINOLINE-1-OXIDE
- effect on mammalian cell lines: 2783
- transformation, properties of transformed hamster embryo cell clones: 2784

4-NITROQUINOLINE-1-OXIDE DERIVATIVES
- s.c. tumors, structure-activity relationship, mouse: 2782

- ITROSAMINE, DIMETHYL-
  - toxicity, liver, mink: 2798
    - effect of protein-free diet, rat: 2799
- -NITROSOGUANIDINE, N-METHYL-N'-NITRO-
  - mutagenesis, bacteria: 2774
    - *Drosophila*: 2773
- -NITROSOUREA, N-METHYL-
  - peripheral nerve tumors, ultrastructure, rat: 2816
- ITROSOUREA DERIVATIVES
  - teratogenesis, rat: 2781
- -NITROSOURETHAN, N-METHYL-
  - mutagenesis, bacteria: 2775
- ORETHYNODREL (17α-ethynyl-17-hydroxyestr[5,10]en-3-one)
  - mammary tumors, mouse: 2814
- UCLEIC ACIDS, DNA
  - adenovirus
    - homology with cellular messenger RNA: 2856
    - types 5, 12 or 18, properties: 2836,2917
    - type 12-infected hamster cells: 2914
  - avian or mammalian, hybridization with Rous virus RNA: 2835
  - carcinogen binding, mechanism, review: 2742
  - circularity and supercoiling, papovavirus: 2855
  - complementarity to SV40 and cancervirus (papovavirus) DNA, transformed mouse and hamster cells: 2842,2843
  - control of mRNA biosynthesis, normal cells: 2841
  - effect of actinomycin, SV40-infected cells: 2885
  - enzymes, viral carcinogenesis, review: 2741
  - Moloney virus leukemia, bioassay, mouse: 2829
  - perimodal variations, human cancer cells: 2974
  - SV40
    - hybridization with leukemia virus or cellular RNA: 2897
    - infected monkey kidney cells: 2890
    - transformed hamster cells: 2891
- JCLEIC ACIDS, RNA
  - associated nuclease, avian myeloblastosis or parainfluenza virus: 2863
  - avian myeloblastosis virus, properties: 2821
  - carcinogen binding, mechanism, review: 2742
  - cellular or leukemia virus, hybridization with SV40 DNA: 2897
  - enzymes, viral carcinogenesis, review: 2741
  - homology of oncogenic (avian myeloblastosis) and non-oncogenic (Newcastle disease) virus RNA: 2862
  - infectious, attempted isolation, Moloney leukemia virus, mouse: 2829
  - messenger, control by DNA, normal cells: 2841
    - homology with adenovirus DNA: 2856
  - Moloney leukemia-sarcoma virus complex, properties: 2861
  - replication, leukosis-sarcoma viruses: 2860
  - Rous sarcoma virus, hybridization with avian or mammalian DNA: 2835

- CCUPATIONAL DISEASES
  - bladder cancer, β-naphthylamine, rubber factory, England (Birmingham): 2937
- OCCUPATIONAL DISEASES (contd)
    - review: 2733
  - industrial epoxy resin hardener (diaminodiphenylmethane) and solvent (γ-butyrolactone), potential carcinogenic effects: 2807
  - mineral exposure, lung and skin cancer, review: 2731
  - pine pollen exposure (wood workers), Hodgkin's disease, geographical variation, U.S.: 2772
  - radiation exposure during systemic radioisotope admin., medical personnel: 2757
  - skin cancer, review: 2732
- OIL YELLOW OB (See Naphthylamine, tolylazo-)
- OVARY NEOPLASMS
  - benign or malignant, sex chromatin: 2972
- OXOLAMINE CITRATE
  - effect on cigarette smoke-induced ciliostasis, cat: 2787

- PETROLEUM
  - and distillates, skin cancer, review: 2732
- PHORBOL ESTERS (See under Croton oil)
- PHOSPHORUS
  - analysis, human tumors: 2970
- PITUITARY NEOPLASMS
  - MtT/F4 mammotropic, effect on hydroxyfluorenylacetamide liver tumors, rat: 2801
- PLASMACYTOMA (See under Myeloma and related diseases)
- PLEURAL EFFUSIONS
  - malignant tumors, Austria (Vienna): 2933
- PONCEAU MX (See 2-Naphtho-3,6-disulfonic acid, 1-(2,4-xylylazo)-, disodium salt)
- POTASSIUM
  - analysis, human tumors: 2970
- PREGNANCY
  - maternal-fetal transmission of Friend virus antibodies, mouse: 2865
- PROSTATE
  - cultures, transformation by skin carcinogens, mouse: 2811
- PROSTATE NEOPLASMS
  - with 2 hormone-dependent and 1 hormone-independent tumors of other sites, case: 2952
- PROTEINS
  - carcinogen binding, mechanism, review: 2742

- QUINOLINE-1-OXIDE DERIVATIVES
  - s.c. tumors, structure-activity relationship, mouse: 2782

- RADIATION
  - exposure levels during systemic radioisotope therapy, medical personnel: 2757
  - immunosuppression, virus-induced mouse leukemia: 2823
  - interaction with leukemia virus, mouse: 2822
  - UV, effect on polyoma virus tumors, hamster: 2848

RADIATION (contd)
      simian adenovirus SA7: 2893
RADIATION CARCINOGENESIS
   bone, child: 2762
   hand: 2765
   juvenile papilloma of larynx to carcinoma: 2763
   kidney, effect of radioprotective agent, rat: 2759
   mammary, rat: 2761
   skin
      occupational, review: 2732
      premalignant lesions, review: 2729
      UV content of sunlight, Australia: 2764
   uterus, human: 2760
   UV-induced malignant transformation, rat or mouse embryonic cells: 2758
RADIATION LEUKEMOGENESIS
   effect of radioprotective agent, mouse: 2759
RADIOACTIVE ISOTOPES AND ELEMENTS
   radiation exposure levels, radiologists: 2757
RADIOPROTECTIVE AGENTS
   effect on radiation carcinogenesis (rat kidney) or leukemogenesis (mouse): 2759
RESPIRATORY TRACT NEOPLASMS
   air polution and socioeconomic status, Illinois (Chicago): 2932
   primary melanoma, pathogenesis, review: 2745
RUBBER
   manufacturing, bladder cancer, β-naphthylamine, England (Birmingham): 2937

SALIVARY GLAND NEOPLASMS
   epidemiology, children, Washington (Seattle): 2929
SCAR TISSUE (See also under Injuries)
   bone, osteoma, review: 2728
   gastrectomy for ulcer, stomach cancer: 2769
   lung, TB, melanoma metastases: 2767
         lung cancer, smoking, Tennessee (Memphis): 2768
   skin, premalignant or malignant tumors, review: 2729
   soft tissues, tumor metastases, lung or breast cancer: 2766
SELENIUM
   analysis, human tumors: 2970
SEX
   chromatin, benign or malignant ovary tumors: 2972
   difference
      esophagus cancer, Wales, ethnic groups: 2924
      methylcholanthrene thyroiditis, rat: 2780
SKIN
   hereditary epidermodysplasia verruciformis, malignant transformation, possible role of virus: 2965
SKIN CARCINOGENESIS
   alkanesulfonate alkylating agents, s.c. sarcoma, rat or mouse: 2813
   bovine papilloma virus, pathology and enzymes, calf: 2851

SKIN CARCINOGENESIS (contd)
   chemical, virus-like particles, transplantation antigen, mouse: 2859
   dimethylbenzanthracene
      s.c. tumors, effect of adenovirus type 16, hamster: 2898
      tumor ultrastructure, hamster cheek pouch: 2810
   methylcholanthrene, s.c. sarcoma, fibrinolysis and tumor growth, mouse: 2812
   nitrogen mustards, s.c. sarcoma, rat or mouse: 2813
   occupational, arsenic, review: 2731
      review: 2732
   polycyclic aromatic hydrocarbons, relation to prostate cell culture transformation, mouse: 2811
   polyoma virus, s.c. tumors, growth and regression, rabbit: 2899
   quinoline-1-oxide derivatives, s.c. tumors, structure-activity relationship, mouse: 2782
   radiation, injury or chemical exposure, hand: 2765
   sunlight, UV levels, Australia: 2764
   SV40, s.c. tumors, effect of adenovirus type 16, hamster: 2898
SKIN NEOPLASMS
   bowenoid carcinoma, hereditary epidermodysplasia verruciformis, possible role of virus: 2965
   digital fibrous tumors, virus isolation, child: 2903
   face, with 3 hormone-dependent tumors of other sites, case: 2952
   keratoacanthoma, RNA-containing virus-like particles: 2818
   malignant transformation of pilonidal sinus, case and review: 2966
   melanoma, extension to TB scar of lung: 2767
   premalignant, radiation-induced or scar tissue, review: 2729
   spontaneous, papovavirus isolation, hamster: 2900
SODIUM
   analysis, human tumors: 2970
SOIL
   magnesium deficiency and acidity, leukemia endemic area, Poland, review: 2730
   trace elements, nasopharynx cancer, Kenya: 2927
STOMACH
   hypertrophic gastropathy (Menetrier's disease), malignant transformation: 2968
   ulcer, cancer frequency, East Germany (Leipzig): 2769
STOMACH NEOPLASMS
   ABO blood groups and ABH secretor status, review: 2744
   epidemiology
      dietary factors, U.S. and Czechoslovakia: 2922
      gastrectomized ulcer pts., East Germany (Leipzig): 2769
      Kenya (western): 2926
      Wales, ethnic groups (Welsh and non-Welsh): 2925

STOMACH NEOPLASMS (contd)
  from Menetrier's hypertrophic gastropathy: 2968
  muscular tumors, frequency, Cuba (Havana): 2921
SV40 (See under Virus, papova)

TERATOGENESIS
  nitrosourea derivatives, rat: 2781
TESTIS NEOPLASMS
  reticulum cell sarcoma, with 2 hormone-dependent and 1 hormone-independent tumors of other sites, case: 2952
  teratocarcinoma, trace element levels: 2970
THYROID
  methylcholanthrene thyroiditis, age and sex difference, rat: 2780
THYROID NEOPLASMS
  with 2 hormone-dependent and 1 hormone-independent tumors of other sites, case: 2952
TOBACCO SMOKE
  air pollution, measurement: 2786
  analysis, gas chromatography, methods and results, review: 2738
    nicotine, method: 2785
  ciliostasis, effect of filtration and oxolamine citrate, cat: 2787
  effect on pulmonary defense mechanisms, guinea pig: 2788
TOBACCO SMOKING
  bladder cancer, review: 2733
  lung cancer, pulmonary TB, Tennessee (Memphis): 2768
  pipe tobacco, leukokeratosis and/or malignant tumors of mouth: 2789
ONGUE NEOPLASMS
  familial congenital telangiectatic erythema and growth retardation (Bloom's syndrome): 2964
OXICITY
  air pollutants or tobacco smoke, pulmonary defense mechanisms, guinea pig: 2788
  aflatoxin, liver, duckling: 2790
  benzanthracene derivatives, effect of amino acids, rat: 2778
  cigarette smoke, bronchus, effect of oxolamine citrate, cat: 2787
  dimethylbenzanthracene, adrenal, ultrastructure, rat: 2777
  dimethylnitrosamine, liver, effect of protein-free diet, rat: 2799
      mink: 2798
  methyldimethylaminoazobenzene, liver, ultrastructure, rat: 2805
  thioacetamide, liver, mechanism, rat: 2800
  tolylazonaphthylamine, liver, mouse or rat: 2794
ROPHOBLASTIC NEOPLASMS (See under Corpus uteri neoplasms)
RYPTOPHAN
  metabolites, bladder cancer, review: 2733

URETHAN
  mechanism of action, review: 2739
URETHAN, N-HYDROXY-
  mechanism of action, review: 2739
UTERUS (See under Corpus uteri)

VIRAL CARCINOGENESIS
  mechanism, review: 2740,2741,2749,2750,2751, 2752
VIRUS
  DNA-containing, human cancer, methods of determination: 2904
    isolation, recurring digital fibrous tumors, child: 2903
  hare tumor, isolation and properties: 2853
  Newcastle disease, RNA homology with avian myeloblastosis virus RNA: 2862
  parainfluenza, RNA-associated nuclease: 2863
  particles, induced skin tumors, transplantation antigen, mouse: 2859
  particles resembling
    human keratoacanthoma, RNA-containing: 2818
    preneoplastic methylcholanthrene-induced brain tumors, mouse: 2854
    transformed mouse cell lines: 2819
  polio or foot-and-mouth disease, particles resembling, spontaneous mammary tumor or lymphosarcoma, dog: 2830
  reo, isolation, Burkitt lymphoma: 2909
  Sendai, Rous sarcoma virus induction, cell fusion method: 2872
    SV40 induction, cell fusion method: 2908
VIRUS, ADENO-
  CELO (chick embryo lethal orphan), effect on SV40 tumors, hamster: 2844,2845
  human, classification, serotype: 2915
    properties of T antigens: 2892
  SA7 (simian), transforming and plaque-forming capacity, radiation effects: 2893
  type 1
    hybrid with SV40 PARA genome: 2858
    transformation, rat cells: 2896
  type 2
    hybrid with SV40 PARA genome: 2858
    nucleotide sequences of viral genes, infected and transformed cells: 2884
    replication, SV40-adenovirus 7 hybrid-transformed monkey kidney cells: 2839
    "superinfection suppression," mechanism, transformed cells: 2857
    transformation, rat cells: 2896
  type 3
    replication, SV40-adenovirus 7 hybrid-transformed monkey kidney cells: 2839
    transformation, rat cells: 2896
  type 4, effect on chromosomes, human embryo fibroblasts: 2912
  type 5
    acetone-degraded particles, structure: 2918
    effect on SV40 tumor transplantation immunity, hamster: 2844

- VIRUS, ADENO- (contd)
  - hybrid with SV40 PARA genome: 2858
  - internal proteins, properties: 2916,2917
    - properties of DNA: 2836,2917
  - type 6
    - effect on chromosomes, human embryo fibroblasts: 2912
    - hybrid with SV40 PARA genome: 2858
  - type 7
    - hybrid with SV40 PARA genome: 2858
    - SV40 hybrid (LL strain SP2)
      - adenovirus replication, transformed monkey kidney cells: 2839
      - properties of hamster tumor and transformed cells: 2840
  - type 12
    - classification of *cyt kb* mutants: 2837
    - DNA replication, hamster cells: 2914
    - effect on chromosomes, human embryo fibroblasts: 2912
      - SV40 tumors, hamster: 2844,2845
    - infection and transformation, hamster kidney cells: 2894
    - properties of DNA: 2836
    - replication, SV40-adenovirus 7 hybrid-transformed monkey kidney cells: 2839
    - "superinfection suppression," mechanism, transformed cells: 2857
    - T antigens, mouse or hamster tumor: 2913
  - type 16, effect on DMBA or SV40 tumors, hamster: 2898
  - type 18, properties of DNA: 2836
  - type 31
    - effect on SV40 tumors, hamster: 2844,2845
    - properties of antigens: 2838
  - viral DNA homology with cellular messenger RNA: 2856
  - Type 2 genital infection, cervix cancer: 2905,2906,2907
- VIRUS, HERPES-TYPE
  - Epstein-Barr (human; Burkitt lymphoma)
  - determination, Burkitt lymphoma cells: 2911
    - infectious mononucleosis: 2910
    - serum antibodies, U.S. and Africa, review: 2753
      - women, Sweden: 2852
  - Marek's disease (chicken), structure and development *in vitro*: 2901,2902
- VIRUS, HYBRID
  - LL strain SP2 (SV40-adenovirus type 7)
    - properties of transformed cells and hamster tumor: 2840
    - transformation, adenovirus replication, monkey kidney cells: 2839
  - SV40 PARA-adenovirus (types 1, 2, 5, 6 or 7), genome complementation: 2858
- VIRUS, LEUKEMIA/LYMPHOMA
  - avian myeloblastosis
    - effect on Rous virus resistance, mouse: 2874
    - group-specific antigen, analysis: 2820
    - RNA, associated nuclease: 2863
      - homology with Newcastle disease virus
    - RNA: 2862
      - properties: 2821
      - replication, mechanism: 2860
- VIRUS, LEUKEMIA/LYMPHOMA (contd)
  - chicken leukosis, immunity, variations, flock of inbred chickens: 2877
  - Friend (mouse)
    - genetic susceptibility: 2825
    - immunization, tumor neoantigens: 2826
    - low- and high-titer cell clones, properties: 2827
    - maternal-fetal antibody transmission: 2865
  - Gross (mouse), host genetics and viral interference, review: 2735
  - hamster, properties: 2879
  - HIPA mesenteric and ascites plasmacytoma (mouse), properties: 2824
  - Moloney (mouse)
    - attempted isolation of infectious RNA: 2829
    - effect on interferon sensitivity *in vitro*: 2871
    - Moloney sarcoma virus complex, RNA properties: 2861
    - replication, human embryo cell lines: 2832
    - virus release and cellular immunosensitivity: 2867
  - mouse
    - effect of immunosuppression (radiation or heterologous anti-thymocyte serum): 2823
    - RNA hybridization with SV40 DNA: 2897
      - replication, mechanism: 2860
    - specific thymolytic effect, radiation interactions: 2822
    - Type C particles, spontaneous lymphosarcoma, dog: 2830
    - viral and virus-induced antigens: 2864
  - NZB mouse, role in autoimmunity syndrome, review: 2743
  - Rauscher (mouse)
    - effect on interferon sensitivity *in vitro*: 2871
    - reduced-virulence strain, properties of carrier culture: 2880
    - splenic invasion, effect of vaccine: 2828
- VIRUS, MAMMARY TUMOR
  - dog, spontaneous, enterovirus-like particles: 2830
  - mouse, viral and virus-associated antigens: 2864
- VIRUS, PAPOVA (papilloma-polyoma-vacuolating)
  - bovine papilloma, tumor histology and enzymes, calf: 2851
  - cancervirus (human cancer cell DNA, mouse cell-adapted)
    - complementarity to cell DNA, transformed mouse cells: 2842,2843
  - DNA, circularity and supercoiling: 2855
  - hamster skin tumors: 2900
  - human wart
    - effect on SV40 tumors, hamster: 2844,2845
    - hereditary epidermodysplasia verruciformis with malignant transformation: 2965
  - intranuclear inclusions resembling, human choriocarcinoma: 2976
  - polyoma
    - cell-dependent mutants, isolation: 2887

RUS, PAPOVA (contd)

- immunity, effect of UV radiation, hamster: 2848
- temperature-sensitive mutants, classification: 2846,2847,2886
- thymidine kinase induction, effect of antimetabolites, mouse embryo cells: 2889
- transformation, amino acid transport: 2849
  - effect of dimethyl sulfoxide, hamster cells: 2850
- virus synthesis activation, transformed cells: 2883

SV40

- actinomycin effect on DNA replication and transcription: 2885
- brain and s.c. tumors, rabbit: 2899
- DNA hybridization with cellular and leukemia virus RNA: 2897
  - synthesis patterns, monkey kidney cells: 2890
- hamster tumors, effect of adenovirus type 16: 2898
- immunization by adenoviruses, hamster: 2845
- induction, cell fusion method (UV-inactivated Sendai virus): 2908
- relationship to cancervirus (papovavirus) and cell DNA, transformed hamster cells: 2842,2843
- replication and antigen synthesis, arginine-deficient medium: 2888
- transformation, DNA and T antigen synthesis, hamster kidney cells: 2891
  - human fetal liver cells: 2895
- transplantation immunity, effect of adenoviruses, hamster: 2844
- virus synthesis induction, transformed cells: 2882

SV40-adenovirus 7 hybrid (LL strain SP2)

- adenovirus replication, transformed monkey kidney cells: 2839
- properties of hamster tumor and transformed cells: 2840

SV40 PARA-adenovirus hybrids, genome complementation: 2858

RUS, POX

- Yaba histiocytoma (monkey), serial passage and quantitation, monkey kidney cells: 2919

RUS, SARCOMA

- avian, viral and virus-associated antigens: 2864

VIRUS, SARCOMA (contd)

- Harvey (mouse), antigenic specificity, tumor cells: 2866
- Moloney (mouse)
  - antigenic specificity, tumor cells: 2866
  - defective, properties: 2868
  - effect on
    - bovine embryo skin cells: 2870
    - interferon sensitivity *in vitro*: 2871
    - mouse, chick or human embryo cells: 2869
  - Moloney leukemia virus complex, RNA properties: 2861
  - mouse or rat tumors: 2869
  - replication, human embryo cell lines: 2832
- mouse, leukemia pseudotypes, properties of transformed cells: 2831
- Rous (chicken)
  - activation, method, hamster tumor: 2875
  - analysis of proteins: 2834
  - hybridization with avian or mammalian DNA: 2835
  - incomplete, mouse embryo cells, tumor induction in adult mouse: 2876
  - induction, cell fusion method: 2908
  - particles resembling, quail embryo cells: 2881
  - rescue by Sendai virus, cell fusion method: 2872
  - resistance, effect of avian myeloblastosis virus, mouse: 2874
  - RNA replication mechanism: 2860
  - tumor induction, baboon: 2878
  - virogenic or non-virogenic rat tumors: 2873
- Yoshida ascites sarcoma (rat), transmission, cell-free preparations: 2833

WATER POLLUTION

- lung and g.i. cancer, U.S., review: 2734

WOOD AND WOOD PRODUCTS

- pine pollen, occupational exposure, Hodgkin's disease, geographical variation, U.S.: 2772

ZINC

- analysis, human tumors: 2970
- soil, nasopharynx cancer, Kenya: 2927

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

If you do not desire to continue receiving this publication, please **CHECK HERE** ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

97405
Vet-Med.

Subject-Author Index

Vol. 7

THE LIBRARY OF THE
APR -3 1970
UNIVERSITY OF ILLINOIS

CARCINOGENESIS ABSTRACTS

National Cancer Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • National Institutes of Health

[illegible]

PROFESSIONAL [illegible]

AUTHOR INDEX

Aaronson, S. A. 1578,1579, 1581,1840,2831
Abad, R. S. 2678
Abbes, M. 1288
Abbott, M. L. 1640
Abelev, G. I. 1364
Abell, M. R. 669
Abelson, H. T. 1607,2388
Abt, D. A. 244,813,814
Achong, B. G. 101,1017,2901
Ackerman, R. F. 2481
Acuff, M. 2570
Adachi, K. 1191,2555
Adamo, F. 553
Adams, E. A. 541
Adams, E. V. 584
Adams, L. R. 1707
Adams, R. A. 1590
Adamthwaite, S. 2254
Adenis, L. 948
Aderca, I. 1859,2642
Adler, A. 1064
Adzhigitov, F. I. 1508
Agarwal, M. K. 1481
Agarwal, S. 634
Agthe, C. 2791
Ahluwalia, H. S. 620
Ahmad-Zadeh, C. 2838
Ahmed, M. 1532,1913,2110
Aho, A. J. 885
Aikat, B. K. 64,2565
Aisenberg, A. 1297
Aizawa, C. 2379
Akamatsu, Y. 300,1438, 1454,1491,1837
Akao, M. 28,2803
Akimov, A. A. 320
Akinosi, J. O. 1942
Al-Awqati, Q. S. 1295
Albert, D. M. 2383
Albert, H. 2769
Albert, R. E. 936,1482,2013
Albores-Saavedra, J. 649
Al-Damluji, S. F. 1295
Aldenderfer, P. H. 1875
Aldrich, C. D. 1839,2837
Aleksandrowicz, J. 678,1637, 2730
Alessandri, M. 489
Alexander, F. 618
Alexander, J. W. 1289
Alexander, P. 2510
Alexandrov, V. A. 288
Al-Falluji, M. M. 2428
Alford, D. O. 884
Allcroft, R. 1417,2793
Allen, D. W. 2820
Allison, A. C. 1522
Alper, J. C. 1646
Alpert, M. E. 2208
Al-Saleem, T. 972
Alstein, A. D. 141,1845
Altemeier, W. A. 1289
Altman, R. F. A. 11,735
Al'tshtein, A. D. 1563,2643
Altucci, P. 1804
Alva, R. A. 393
Alvares, A. P. 1429,2324
Alvarez, Y. 2841,2842,2843 2897
Amadori, D. 2946
Amalfi, M. 880
Ambrose, E. J. 2956
Ambrose, K. R. 2091
Ambrosino, C. 1803
Ambrosioni, J. C. 1593,2106
Ambrus, J. L. 1599,1877,2384
Ambs, E. 1357
Amend, D. L. 517
Ames, R. P. 1872,2416
Amos, D. B. 457
Anchev, N. 2117
Andelman, S. 2932
Anderson, A. E., Jr. 720
Anderson, C. K. 2451
Anderson, D. E. 1325,1976
Anderson, G. R. 338
Anderson, H. J. 2054
Anderson, J. 1566,2367
Anderson, J. W. 1348
Anderson, L. J. 406,608,1070, 1960,2162
Anderson, N. G. 1919,2370
Anderson, P. N. 2297
Anderson, R. E. 544
Anderson, R. K. 809
Andreev, V. C. 883
Andreeva, A. Kh. 636
Andresen, W. F. 2188
Andrews, E. C. 2131
Andrews, H. 1574
Andrews, J. C. 888
Andrews, J. L. 1269
Andrews, P. A. J. 922
Andrianjatovo, J. 1943
Angervall, L. 1751
Ankerst, J. 2088
Ansari, I. H. 487
Ansfield, F. J. 1470
Anton, M. 258
Antonius, J. I. 211
Aoki, T. 1018,1019, 1020,2601
Aponte, G. E. 481
Araki, C. 1946
Araki, M. 97,2530,2782
Aranda, J. M. 1625
Arata, T. 1446
Arber, W. 464
Arcasoy, M. M. 1328
Archer, F. L. 2591
Archer, P. G. 25,1163
Archer, V. E. 2522,2524
Arcos, J. C. 51,1423,1999, 2279,2742,2806
Areosa, J. 2684
Argus, M. F. 51,1423, 1999,2742
Argyris, T. S. 2055
Arhelger, R. B. 2131
Aries, V. 2809
Arima, M. 1935
Arkhipov, G. N. 1750
Armijo, M. 1175
Armstrong, D. 1552,2359
Armynot Du Chatelet, M.-F. 1249
Arnesen, K. 231
Arora, D. J. S. 2181
Arseculeratne, S. N. 2587
Arseni, C. 1947
Arundell, F. D. 2283
Arvin, J. M. 282
Asadov, D. A. 318
Ashikara, T. 2449
Ashkenazi, A. 1580
Ashley, D. J. B. 2121,2122, 2924,2925
Ashley, L. M. 296
Assan, R. 2471
Atanasiu, P. 1854
Atchison, R. W. 545
Atkin, N. B. 186,2974
Atlee, J. L., III 1667
Attramadal, A. 225
Auerbach, H. 1493
Auerbach, O. 71,1212,1213, 2545
Aula, P. 1841
Auriol, M. 1290
Avellán, L. 508
Avila, L. 2342
Axelrad, A. A. 1024,2598
Axelrod, D. 1993,2374,2380
Ayad, S. R. 419
Aylett, S. O. 412
Ayre, J. E. 650,774,1310
Ayres, J. C. 1228
Ayres, J. L. 517,1226,1227
Ayvazian, L. F. 190
Azar, H. A. 557
Azuma, M. 2379

Baba, K. 2614
Babyak, M. A. 2011
Bachmann, K. D. 386
Bacon, H. E. 613
Bader, J. P. 796,1048,1517, 1518,1603,1832
Bagby, S. P. 1616
Baggish, M. S. 1110
Bagshawe, K. D. 2296
Baguena Candela, R. 2190
Baikie, A. G. 182,192,2962
Bailar, J. C., III. 404
Bailey, C. 1239
Bajtai, A. 2006
Bajwa, G. S. 1396,2012
Bakay, B. 1237,1238
Baker, B. L. 2814
Baker, C. P. 472

Baker, H. W. 2010
Baker, J. M. 2293
Baker, J. R. 1448
Baker, T. D. 183
Baldi, A. 920
Balducci, D. 2853
Baldwin, R. W. 757
Balis, M. E. 2184
Ball, J. K. 291,2041
Balli, R. 1970
Ballini-Kerr, I. 735
Balls, M. 908,2334
Balmus, G. 2631,2632
Baló,'J. 716
Balsaver, A. M. 656
Bălus, L. 2520
Bambèrger, K. 799
Bamford, S. B. 662,2458, 2718
Bandunatha, C. H. S. R. 2587
Banerjee, M. R. 1617
Bang, F. B. 180,1046,1842
Bank, A. 525
Bannasch, P. 275,1743
Barabás, G. 877
Baradnay, G. 417
Baranov, A. E. 1979
Barat, N. 2629
Barbanti-Brodano, G. 1865
Barber, R. S. 1795
Barbieri, D. 607,849,1817
Bard, D. S. 2295
Barden, R. P. 2470
Bardin, C. W. 1548
Bardos, T. 1877
Barendsen, G. W. 2700
Barge, J. 2244
Bariéty, M. 2931
Barmes, D. 397
Barnard, R. O. 670
Barnawell, E. B. 1617
Barnes, J. M. 746
Baron, S. 2086,2410
Baroni, C. 278
Barrientos, E. 2693
Barron, B. A. 1318
Barry, A. 2721
Barry, E. J. 1483
Barski, G. 607,849,1037, 1684,1817,1818
Barth, R. F. 360
Bartlett, G. C. 2124
Bartlett, G. L. 1492
Bartus, B. 756,2808
Barylko-Pikielna, N. 967, 968
Baserga, R. 2045
Bashirov, M. Sh. 609
Basilico, C. 2376
Basset, F. 1203,1204
Bassily, S. 2171
Bates, B. 2413
Bates, F. 1229
Bates, R. R. 277
Bather, R. 374,1536
Bátkai, L. 1572
Battistini, V. 1073,1074
Bauer, D. H. 2585
Bauer, H. 800,2609,2874
Bauer, R. 2203
Bauke, J. 432
Baulieu, E. E. 435
Bavetta, L. A. 1396,2012
Bavli, Ia. L. 1345
Baylor, C. H. 169,2540
Bazan, O. I. 1082
Bazex, A. 1333
Bazikian, K. A. 320
Beard, D. 121,1819
Beard, J. W. 121,245, 1819,2082
Becerra Caballero, O. 2693
Becker, J. 2331
Becker, N. H. 771
Becker, Y. 2888
Beddow, T. G. 1002,1003
Bedoya, V. 1060,1247
Begeman, C. R. 56
Behbehani, A. M. 1507
Beierle, J. W. 359
Beker, S. 149
Belamaric, J. 1642
Beliaev, Iu. A. 485
Bell, C. 2302
Bell, T. M. 1809
Belpomme, D. 2335
Benasco Naval, C. 2681,2682
Benassi, E. 471
Benatti, G. 1970
Bender, E. 1011,2879
Benedetti Valentini, S. 1959
Benedetto, A. 1816
Benedict, R. C. 1458
Bengtsson, U. 1751
Benjamin, B. 503
Benjamin, E. S. 2526
Benjamin, T. 2887
Benjamin, T. L. 1848
Benn, M. 1012
Bennett, D. E. 2131
Bennett, J. M. 2174,2753
Bennett, M. 1025
Bennett, P. 2013
Bennington, J. L. 1089,1957, 2453
Benoit, W. 87
Bensasson, M. 2471
Benso, L. 1803,1857
Bensted, J. P. M. 49
Bentvelzen, P. 130,838, 1053,1232
Benyesh-Melnick, M. 1521,2435, 2861,2910
Berard, C. W. 2753
Berdon, W. 2762
Berenblum, I. 1137,2518,2519
Berezovskii, B. S. 476,935,2228
Bergamini, F. 337
Berge, T. 1315
Berger, H. 18
Berger, U. 2307
Bergeron, J. R. 2016
Bergolz, V. M. 556,1267
Bergs, V. V. 242
Berk, J. E. 645
Berkmen, Y. M. 913
Berman, L. D. 1036,1565,2616 2866,2913
Bern, H. A. 216
Bernard, C. 795,1034,1040, 1612,2832
Bernard, J. 405
Bernardini, A. 1865
Berndt, H. 172,2116,2132, 2443
Bernhard, W. 251,2089
Berry, E. W. 2174
Berry, R. J. 269
Berryman, S. 1569
Berstein, L. M. 1330
Bertin, B. A. 2603
Bertoli, G. 278
Bertolotti, E. 2727
Bertorello, G. 654
Berumen, L. 2335
Bessas, G. 2173
Best, P. V. 2381,2899
Besznyák, I. 2006
Betlejewski, S. 2951
Beuving, L. J. 310,1487
Bhattarcharya, B. 615
Bianchedi, S. 2727
Biancifiori, C. 294,493,494, 2543,2544
Biberfeld, P. 2347
Bieberfeld, P. 2867
Bielewicz, H. 1031
Bielschowsky, F. 1442
Bielschowsky, M. 1442
Biernoth, G. 330
Bierwolf, D. 785,1011,2001, 2627,2879
Biggs, P. M. 364,1016,1017, 2901
Bigotto, M. R. 2654
Bilski-Pasquier, G. 873
Bingas, B. 1701
Biozzi, G. 601,853
Birath, G. 1161
Biriulina, T. I. 1044,2621, 2875,2876
Bisbini, P. 629,2654
Bischoff, F. 1140,1494
Biskis, B. O. 770,931,2391
Biswal, N. 1521,2861
Bitoon, M. 944
Bivens, M. D. 166
Bjarnason, O. 2942
Bjerknes, R. 733
Black, L. M. 2625
Black, P. H. 686,1128,2373, 2426,2615
Black, W. P. 1754
Blair, C. D. 1032,1257
Blair, D. W. 2381,2899
Blair, N. 2517

air, P. B. 119,134,840,
 1051,1542,1615,2084,2362
akeslee, J., Jr. 1591
amey, R. W. 2292,2293
anchard, J. 2311
anchard, R. L. 2524
ank, F. 1198
anzat-Reboud, S. 2575
att, E. S. 913
aufox, M. D. 1646
enkinsopp, W. K. 1721
iznakov, E. G. 380
ock, G. E. 878
oom, A. D. 25
um, S. F. 213
umberg, B. S. 1671,2490
umenschein, G. R. 1275
umenson, L. E. 1366,1967
unck, J. M. 1401
uth, I. 482
bkov, A. G. 287
brov, Y. F. 1330
ccond-Gibod, L. 2471
ck, F. G. 6,65,73,1197,
 1209,1501,2023
denham, D. C. 863
din, G. 1799
dine, R. L. 2015
egler, F. 698
gardus, G. M. 5
ger, E. 67,1144,2321
ggs, D. R. 1101
hlig, H. 14
hman, Y. V. 1330
horquez, J. F. 1968
iron, M. 795,1033,1034,
 1040,1519,1612,1825,2630,
 2832,2870,2871
itnott, J. K. 2247
jan, O. 2804
lande, R. P. 2468
lano, C. R. 1507
llmann, R. 737,2266
nd, B. 1780,2284
nd, H. E. 1899,2361
nhag, R. S. 134
nmassar, E. 730,1447
nneau, H. 995
one, C. W. 894
othe, A. D. 1274
pp, W. 2398
rdiushkov, Iu. N. 666
reisha, I. 2047
rek, C. 362,2484
rella, L. 2404
rges, C. C. 610
rges, E. J. 2129
rneff, J. 323,940
örner, P. 752,753
rsos, T. 422,423,1046
schetti, A. E. 2308
selli, P. L. 898
ösenberg, H. 2755
smann, H. B. 1575,2617
ösmüller, H. 2240
tham, S. K. 1723
Botkin, C. 92,321
Botstein, D. 2774
Bouchayer, M. 2241
Boucher, M. 2832
Bourali, C. 1250
Bourdin, J. S. 2971
Bourgaux, P. 1849
Bourgeois, C. H. 2026
Bourguignon, M.-F. 1849
Bousquet, W. F. 1420
Bousser, J. 873
Boutet, M. 2966
Boutwell, R. K. 1195,2287
Bowdon, B. J. 371
Bowen, J. M. 1618
Bowen, P. 428
Bowie, M. 2068
Bowles, C. A. 338
Bowles, N. D. 365
Bowman, B. G. 1596
Bowman, R. W. 1172
Boyce, W. H. 2667
Boyd, J. T. 2127
Boyden, R. 1259
Boyland, E. 1141,1989
Boyse, E. A. 234,235,900,
 901,1018,1019,1020
Bożek, J. 1285
Brachmann, I. 85
Bradbury, J. T. 617
Bradshaw, E. 1065
Bragg, K. 2128
Brailovsky, C. A. 2089,2369,
 2616
Brand, K. G. 732
Brandão, H. J. S. 186
Brande, R. 1795
Brandt, L. 2958
Brandt, P. 1259
Brandt, R. B. 1012
Branton, P. E. 1850
Brasfield, R. D. 2745
Braun, D. D. 1733
Braun, W. 464
Braunig, G. 203
Breedis, C. 2098,2425
Brehaut, L. A. 2192
Breine, U. 508
Brennan, K. 2853
Bresch, H. 1497
Bresciani, F. 453
Bresnick, E. 747,2318,2797
Brett, G. Z. 503
Breull, W. 1966
Briggs, L. 1277
Briggs, R. L. 179
Brill, E. 40,1774
Brilliant, M. D. 1979
Briziarelli, G. 2572
Brocheriou, C. 1290
Brode, E. 527
Brodey, R. S. 646,1815
Brodsky, I. 1255,1256
Bromberg, B. E. 415
Bronk, B. V. 1104
Brooks, R. E. 322,402
Brookes, P. 681,711,1240
Brookes, V. S. 611
Bross, I. D. J. 70,502,864,
 974,1366,1967
Brossi-Bianchi, M. L. 2727
Brouty-Boyé, J. 1036
Brovko, T. E. 1712,1972
Brown, B. I. 1328
Brown, C. D. 925
Brown, D. 216
Brown, D. E. 2209
Brown, E. R. 1808,2408
Brown, E. V. 96,497,701
Brown, R. C. 1498
Browning, D. 1294
Browning, L. S. 2773
Brownlie, B. E. W. 478
Brubaker, C. A. 1349
Brucher, J. M. 280
Bruck, W. E. 2766
Brues, A. M. 1493
Bruninga, G. 668
Brunt, P. W. 1973
Bruze, M. 2533
Bryan, C. S. 2247
Bryan, G. T. 1470,1471,1766,
 2036,2327,2550
Brynjolffson, G. 409
Bryson, G. 1140,1494
Bubenik, J. 1041,1264,2352
Bucciarelli, E. 493,494,
 2543,2544
Bücheler, J. 89,90,740,741
Bücher, H. O. 2242
Buder, E. 2758
Buell, P. E. 32,2672
Buffett, R. F. 1600,2337,
 2338
Buhl-Jørgensen, S. E. 1332
Bühler, E. M. 2509
Bukhtoiarova, E. M. 485
Bulbrook, R. D. 1119
Bulfone, L. M. 782,1875
Bullerman, L. B. 1228
Buoen, L. C. 732
Burdette, W. J. 1638
Burdine, J. A., Jr. 2366
Burford, B. O. 712
Burg, C. 839
Burger, M. M. 997,2394
Burgoyne, G. H. 819
Burk, D. 1502
Burka, B. 577
Burkhalter, A. 2317
Burkitt, D. P. 1156,1661,
 2926
Burlingham, B. T. 2423
Burmester, B. R. 580,581,819,
 1262,1531
Burnett, J. P. 352,999
Burns, E. L. 1094,1095
Burns, E. R. 2747
Burns, F. J. 936,2013
Burns, W. H. 2615
Burrowes, J. T. 650
Burstein, S. 2581

Burton, D. S. 2362
Busatti, L. 2655
Busch, H. 743
Bushar, H. F. 579
Buss, H. 957
Butel, J. S. 139
Butler, J. J. 571
Butler, M. P. 2697
Butler, W. H. 746,1149,1746
Butterworth, S. T. G. 2195
Buu-Hoi, N. P. 42,728,1495, 2053
Bykovski, A. F. 2643

Cabraal, S. A. 1949
Cabre, J. 1368
Cabrini, R. L. 866
Cacciari, P. 2478
Cachin, Y. 1307
Caffrey, M. 2290
Cahan, W. G. 1215
Calafat, J. 1543
Calcutt, G. 83
Calderoni, F. J. 41
Callender, J. 2847,2886
Calvet, J. 1135
Calvo de Mora, S. 2683,2684
Cameron, H. M. 2691
Cameron, J. R. J. 918
Campbell, C. B. 1206
Campbell, S. D. 22
Campbell, T. C. 987
Campbell, W. F. 1604
Camus, G. 2604
Camus, J.-C. 473
Candler, E. L. 2370
Canivet, M. 1825,2871
Cantaboni, A. 1441
Capps, W. I. 2628
Capronnier, C. 2931
Carbone, P. P. 2753
Cardiff, R. D. 119,1542, 1615,1836
Carel, R. 871
Carleton, F. J. 2077
Carnes, J. E. 2197
Carnes, W. H. 1596
Carnow, B. 2932
Carnow, B. W. 62
Carol, W. 1091
Caroline, N. L. 1878,2399
Carp, R. I. 2375,2885
Carpenter, C. P. 2534
Carranza Garcia, J. V. 1624
Carrata Thomas, A. 1162
Carrington, M. J. 2302
Carswell, E. A. 758
Carter, L. P. 541
Carter, R. L. 60,295,2254, 2289,2798
Carter, S. B. 1106
Carvalho, R. P. S. 2146
Casarett, L. J. 9
Casey, A. E. 267
Casey, H. W. 1172
Cass, A. S. 2667
Cassady, J. R. 2009
Cassin, C. 2458
Cassingena, R. 1863,2392
Castigliano, S. G. 506
Castilla-Pertiñez, R. 1174
Castillo, J. 27
Casto, B. C. 142,545,2417, 2418,2893
Castoldi, G. L. 655
Castro, H. F. 765
Cattaneo, R. 1441
Cavalleri, A. 59
Ceglowski, W. 2401
Cenni, P. 629,630
Cernicanu, D. 2520
Cerny, E. A. 2796
Cervenka, J. 214
Cha, J. W. 2554
Chablani, T. D. 165
Chabot, J. 1204
Chai, L. S. 775
Chaklin, A. V. 2119,2163
Chakrabarty, A. 2401
Chakravorty, R. C. 929
Chamorro, A. 1022
Chan, S. P. 2350
Chang, L. M. S. 116,588, 841,1586
Chang, R. S. 345
Chany, Ch. 2616
Chapman, A. L. 792,2398
Chapman, W. L. 2515
Charachon, R. 1335
Chassin, L. N. 340
Chatterjee, R. 615
Chau, A. S. 1642
Chauvergne, J. 515
Chen, C. C. 1472
Chen, L. 2518,2519
Chen, T. T. 2811
Chermann, J.-C. 2345
Chernay, P. R. 2973
Cherry, J. 2698
Chervenick, P. A. 1101
Chessin, L. N. 772,1559
Chesterman, F. C. 1565,2094, 2873
Chi, C. H. 1171
Chiarioni, T. 2472
Chieco-Bianchi, L. 368,597, 845
Chiga, M. 29
Chigirinskii, A. E. 1563,1845
Chigot, P.-L. 2935
Chin, O. 1198
Chin, T. D. Y. 792
Chiricută, I. 2804
Chirigoš, M. A. 572,577, 2350,2597
Chiu, R. J. 2625
Cho, Y. J. 496
Choi, N. W. 1308
Chojnowski, J. R. 1217
Cholak, J. 1463
Chomet, B. 2546
Chomette, G. 1290
Chomiak, T. W. 824
Chopra, H. C. 131,366,1276
Chorazy, M. 2487
Chou, J. T. Y. 1965,2298, 2299,2300
Chouhan, S. S. 634
Chouroulinkov, I. 1732,2183
Christensen, C. M. 1183,1229
Christian, G. 2555
Christian, J. C. 264
Christie, G. S. 2274
Chu, E. H. Y. 1797
Chu, E. W. 1004
Chuat, J. C. 1040,1612,2866
Chubb, R. C. 364,2109,2902
Chuinard, R. G. 402
Chung, D. H. 2692
Church, K. 185
Churchill, A. E. 1015,1016, 1017,2109,2901,2902
Churchill, W. H., Jr. 422, 423,1792
Çhýle, P. 1264
Cinátl, J. 2356
Ciocco, A. 263
Cirenei, F. 2705
Cirillo, R. 471
Cirures, A. 2520
Ciufecú, E. 2631,2632
Clapp, N. K. 531,976,1469
Clark, C. D. 1272
Clark, G. 2385
Clark, R. L. 2514
Clark, W. R. 835
Clarke, C. H. 2775
Clarke, W. J. 695
Clawson, C. C. 1801
Cleaver, J. E. 1369
Clemens, J. A. 283
Cleveland, J. C. 2048
Clifford, P. 1340,1504, 2105,2927
Clymer, R. 2340,2341,2400
Coates, H. 1046
Cocchi, R. 958
Cocchi Belisario, C. 958
Cochet, G. 995
Cochran, A. J. 2007
Codegone, M. L. 1421,2270
Coggin, J. H., Jr. 1582,2091
Cohen, A. 1069,1626
Cohen, D. 560,1758
Cohen, H. 2398,2405
Cohen, M. H. 2753
Cohen, M. M. 1719
Cohen, S. M. 1470
Coiscou, A. G. 881
Colafranceschi, M. 298,1413
Colby, C. 379
Cole, F. H. 2768
Cole, J. W. 2048
Cole, P. 1297,2215
Coleman, N. 1987
Coll, J. 1135
Collet, M. 1799

ollins, R. 415
ollins, T. F. B. 535
olnaghi, M. I. 2306
olomb, D. 1164
olucci, J. M. 56
ompton, P. 2389
onde-Otero, F. 2921
onen, P. E. 455
onfer, D. B. 2276
ongdon, C. C. 2427
onnelly, R. R. 1080,1081, 2151
onner, G. H. 338
onney, A. H. 2539
onnon, A. F. 2944
onnor, G. H. 559
onte, A. J. 950
onti, E. 2655
onzelman, G. M., Jr. 2253
oombs, M. M. 1449
ooper, E. H. 176,2451
ooper, J. E. 2022
ooper, J. T. 77
ooper, M. D. 580,581
ooray, G. H. 1945
oppey, J. 370,1036, 1250
oppleson, M. 468
oraggio, F. 1804
orda, G. 553
ordero De Pratt, D. C. 2941
orkill, A. G. L. 2018
ornell, G. N. 2136
orradi, G. 2670
orrea, P. 1303,1933
orrell, N. 2546
ortez Pimentel, J. 2725
osgrove, G. E., Jr. 241
osta Carvalho, M. R. 626
ostantino, R. F. 1962
ostanzo, G. 2833
oto, V. 1804
ottafava, F. 628,2727
oupey, S. 1477
ousineau, G. 1234
ovarrubias, C., J. H. 2688
ovelli, V. 1498
oventry, M. B. 1944
owles, C. A. 2593
ox, B. 1761,2328
ox, C. E. 2667
oy, P. 1085
addock, V. M. 1431,2256
aig, A. W. 531,976,1469
alley, L. J. 1464
amer, F. 464
ane, S. C. 98
awford, L. V. 1354,2855
emer, N. E. 1608,2348
ighton, G. W. 563,1008, 1009,1010
ittenden, L. B. 125,1047
ocker, T. T. 268
oft, C. J. 1449
onin, A. P. 1773
Crosby, D. L. 2293
Crossen, P. E. 2192
Crosswhite, L. H. 1113
Crout, D. W. 2253
Crowther, J. S. 2809
Crozier, E. H. 1093
Csapó, Z. 187
Csernay, L. 1412
Csuka, O. 1444
Cudkowicz, G. 1025
Cuello, C. 1303,1933
Cumming, R. B. 891
Cummins, G. T. M. 164
Cure, S. F. 1608
Curphey, T. J. 80
Currie, G. A. 2296
Curtis, M. R. 727
Cutler, S. J. 2151,2923
Cutts, J. H. 1188,2301

Daams, J. H. 838
Dabrowski, S. 1906
Dacka, E. 170
Dahlin, D. C. 1165
Dale, E. 61,2779
Dalhamn, T. 65,72, 969,2787
Dallavalle, R. 730,1447
Dalldorf, G. 337,2146
Dalmasso, A. 391
Dalton, A. J. 132
Daniel, C. W. 185,1051
Dannenberg, H. 85
Dao, T. L. 1139,1408,1789
Daoust, R. 261,1234,1480
Darbyshire, J. H. 1565
Darlington, R. W. 1589,2636
Darte, J. M. M. 2662
Das, B. R. 2928
Das, P. K. 2928
Dasgupta, T. K. 2745
Da Silva, D. J. 735
D'Ath, E. F. 1442
Datta, B. 1990
Datta, R. K. 1990
Datta, S. P. 2950
Dausset, J. 220,405
David, D. 1164
David, J. 662,2458
Davidson, A. 1488
Davidson, C. S. 2208
Davies, D. G. 1941
Davies, J. N. P. 253
Davies, R. F. 313
Davis, H. J. 1111
Davis, W. C. 154
Dawe, C. J. 175,1995
Dawson, D. A. 2041
Dawson, P. J. 1023,1601,2596
Day, T. D. 313
Dayan, A. D. 2158
De, P. 615
Dean, P. N. 1696
De Barbieri, A. 570
De Barros Coelho, R. 626
DeBaun, J. R. 755,1484
De Bonaparte, Y. P. 866
De Capoa, A. 525
De Carvalho, A. R. L. 626
DeCarvalho, S. 2460
Dechambre, R. P. 812,1339
Deckers, C. 939,1422
Deckert, M. 2311
Decleve, A. 1889
Decristoforo, A. 396
De Dulanto, F. 1174,1175
Defendi, V. 711,1057,1619, 1682,1864,1910,2430
Deftos, L. J. 2378
De Gonzalez, M. 149
De Grandis, C. 2655
De Groc, J. 2671
De Grouchy, J. 452,873,2459
De Harven, E. 104,122,240, 591,777,1552,1815
Deichmann, W. B. 763,1774
Deinhardt, F. 1920,2414
Deisenhammer, E. 15
De Kohler, G. B. 2939
Delachaux, A. 392
Delage, J. M. 2721
Delain, E. 2354,2604
De Lamirande, G. 2181
Delassus, M. 2790
De La Vega, G. A. 150
Delescluse, C. 357
DeLeva, A. M. 1847
De Lizardi Calderon, E. 2954
Della Porta, G. 679,1130
Della Torre, G. 2305
Delwaide, P. 742,2273
Demaille, A. 948
De Medici, A. 898
Dementieva, V. V. 1267
Demissie, A. 2852
De Nava, C. 452,873
Denborough, M. A. 2744
Denham, C. 2452
Dent, P. B. 580,581,1801
Denunzio, A. 1405
DeOme, K. 1616
DeOme, K. B. 137,840,1051, 1542,1768
De Padova, A. 1259
Depaoli, M. 920
De Pasqualini, C. D. 542
De Ratuld, Y. 583,2881
De Ridder, L. 199
DeRoche, G. 1493
Dérot, M. 2471
Desai, P. B. 2129
De Sauvage Nolting, W. J. J. 1925
Desbordes, J. 1134,1205
De Scoville, A. 1296
De Sèze, S. 2141
Deshpande, N. 1119
De Silva, L. M. 2587
De Somer, P. 1001
De-Thé, G. 248,603,846,1036, 1593,2106,2355,2607

De Tkaczevski, L. 122
De Torres, R. A. 2647
DeTreville, R. T. P. 2011
Detroux, J. 930
Dettmer, C. M. 481
Deutschländer, N. 1867
De Vargas, F. 1804
Devik, F. 222
DeVita, V. T. 2452
Dewhurst, F. 2060
Dezani, M. 1335
Dezfulian, M. 840
Diad'kova, A. M. 2610
Diamandopoulos, G. T. 113,145, 1283,1577,2372
Diamond, L. 711,1403, 1473,1717
Diaz de León, A. 1623
Di Bella, S. 2478
DiBerardino, L. A. 2337,2338
Dick, R. G. 47
Dick, V. S. 2938
Dickinson, B. M. 1269
Diehl, V. 342,344,1505
Dienes, G. J. 1104
Dienstag, J. 1408
Dieter, P. 2281
DiGeorge, A. M. 2963
DiGiacomo, R. 2090
Di Guglielmo, R. 2706
Dillard, R. D. 1476
Dillingham, L. A. 1785
Dilman, V. M. 1330
Di Mayorca, G. 2847,2886
Dimmette, R. M. 2465
DiPaolo, J. A. 115,1474, 1479,2034
Di Paolo, N. 389
Dipple, A. 681
Dirksen, E. R. 268
DiStefano, H. S. 797,1263
Di Virgilio, G. 1358
Dixon, F. J., Jr. 1158
Dixon, G. J. 2389
Dixon, R. A. 2148
Djaczenko, W. 1816
Dmitriev, V. N. 2574
Dmochowski, L. 377,558,1618, 1805,1806,1874,2514
Doak, P. B. 1800
Dodd, M. C. 2428
Dodo, H. 2137
Dodonova, N. N. 141,1563, 1845,2643
Doell, R. G. 1499,2397
Doerfler, W. 2423,2914
Döhner, L. 2915
Doll, R. 227,228,620,1207, 2112,2127,2440
Dolphin, G. W. 682
Domingo, E. O. 2276
Dominici, L. M. 2654
Donahoo, J. S. 2949
Donald, W. G. 2230
Donaldson, A. W. 2495
Dondo Lascano, F. 2224
Donelli, M. G. 1633
Donner, L. 1264,2356
Donovan, P. 1474,2034
Dontenwill, W. 717,729
Doolittle, D. P. 263
Doouss, T. W. 1119
Do-Phuoc, Hien 2053
Dore, J.-F. 2335
Dörfler, H. 87
Dörken, H. 2664
Dorn, C. R. 1292,1293
Dorsey, M., Jr. 1870
Dougherty, R. M. 247,797, 1263
Dousset, G. 1134,1205
Dove, L. F. 1737
Dowd, J. E. 864
Downing, H. J. 2744
Downs, W. L. 764
Drăghici, A. 895
Dragon, V. 647
Drasar, B. S. 2809
Dreesman, G. R. 1282
Dreyer, K. 624
Driessens, J. 948
Drnková, V. 2134
Drozdzewska, Z. 156,1924
Druckrey, H. 89,90,528, 738,741,1727
Druet, P. 2141
Dryll, A. 2141
Dubbs, D. R. 831,1584,2647
Düchting, W. 676
Duesberg, P. H. 826,1032, 1257,1831,1836
Duffy, J. J. 96
Duflo, B. 395
Dufour, M. 728
Dugue, E. 1933
Duhamel, J. 876
Duke, G. A. 1221,2549
Dulbecco, R. 114,830,1860, 2214,2750
Dulmadge, E. A. 371
Dul'tsin, M. S. 1336
Duncan, J. T. K. 652
Dungworth, D. L. 1271,1740
Dunham, L. J. 404,413,1133
Dunkel, V. 550
Dunkel, V. C. 1592
Dunn, J. E. 2672
Dunn, J. E., Jr. 32,158,2150
Dunn, L. J. 617
Dunn, T. B. 1490
Dunne, H. W. 1272
Dunning, W. F. 727,1489
Duperrat, B. 2588
Duplan, J.-F. 2243,2759
Dupont, A. 2172
Dupré, A. 1333
DuPree, L. T. 894
Dupuy, J. M. 405
Durant, J. R. 1645
Durnov, L. A. 441
Durr, F. E. 366
Dutcher, R. M. 1266,2085
Dutta-Choudhuri, R. 929
Duwoos, H. 1205
Dux, A. 133,173,2363,2590
Dvoirin, V. V. 218
Dvoyrin, V. V. 2118
Dyment, P. G. 1349
Dzenis, V. A. 1958
Dzhioev, F. K. 318
Dziak, A. 1177

Eagle, H. 893
East, J. 1524
Easterday, C. L. 1099
Easty, G. C. 2956
Ebbesen, P. 573,1672,2499
Ebbin, A. J. 1978
Ebert, J. 2398
Ebert, J. D. 2835
Ebert, P. S. 1602,2597
Eckardt, R. E. 1157
Eckhart, W. 2846
Eddy, B. E. 1004
Edfors, M.-L. 969
Edmonson, J. H. 177
Efskind, J. 1629,1738
Egawa, J. 2972
Ehlers, G. 725
Ehrentraut, W. 2262
Ehrhardt, J.-P. 1715
Ehrhart, H. 87
Eidson, C. S. 820,821,822
Einhorn, M. 2973
Eisenberg, H. 1081,1303
Eisenberg, H. S. 1098
Eisenbrand, J. 281
Eker, P. 1738
Ekman, H. 1751
Elashoff, R. M. 454
Elgjo, K. 505
Elgjo, K. M. 223
Elkind, M. M. 16,17,26
Ellison, M. L. 2956
Ellison, R. R. 775
Ellsworth, P. A. 1602,2597
Ellsworth, R. M. 2009,2704
Elmenhorst, H. 84,717,719
Elveback, L. R. 1071
Emanoil-Ravicovitch, R. 2630
Emanuel, N. M. 2477
Embil, J. A., Jr. 1005,1561
Emch, J. R. 1328
Emrich, K. 281
Encut, I. 95
Enden, J. A. 2760
Enders, J. F. 1283,2372
Endo, H. 1363
Endoh, T. 1558
Engel, C. R. 938
Engel, E. 196
Engebrecht, R. H. 517
Engel-de Montmollin, M. 196
Engelhardt, K. 91
Engle, G. C. 2085
Engle, R. L., Jr. 2200
Enomoto, H. 1699

nomoto, M. 303,1406
ntin, S. D. 2005
pstein, E. 2128
pstein, M. A. 101,1017,
1648,2901
pstein, S. M. 756,2808
pstein, S. S. 45,53,
1467,1716
pstein, W. L. 1012
rb, P. 1843
rickson, R. R. 2561
rikson, E. 2395
rikson, R. L. 2395,2821
rkman, B. 455
rlich, D. 2126
rnoult, J. L. 1205
rokhin, R. A. 485
rshoff, B. H. 1396,2012
rshova, K. P. 1398
rtürk, E. 1471
scalonilla, F. 2683,2684
sfahani, M. 1231
skins, K. 1408
spiner, H. J. 1926
spmark, J. 2911
stefan, R. M. 966
stola, T. 2877
strin, J. 1334
tman, I. K. 653
vans, C. A. 2097
vans, I. A. 1147
vans, J. 994
vans, V. J. 2186,2188
ylar, E. H. 1575
yquem, A. 2971
zdinli, E. Z. 1650

ábián, B. 331
abian, J. A. 51,2806
abisch, P. 361,1280
abrikant, J. I. 2698
abris, N. 278
adda, G. 2595
agan, P. A. 2003
ahey, J. L. 1056
alcoff, E. 370,1036
alcoff, R. 370
allon, R. J. 778
ankhauser, R. 2694
antini, F. 1441
aragó, L. 635,1937
arber, E. 450,756,2808
arrell, C. 770,2391
arrell, R. L. 1063
arrow, G. M. 430
aulkin, L. J., Jr. 1051
avino, A. 59
ebles-Padron, D. 2126
echner, R. E. 765,884
ederman, M. 1887
efer, A. 105,109,575,
1039,1611,1885,2078
eichtner, A. 1739
eingold, J. 873
eingold, N. 405
Feinleib, M. 399
Feiring, E. H. 257
Feldman, D. G. 789,1595
Feller, W. F. 131,1276,
1278,1899,2361
Fenyö, E. M. 2347,2867
Feo, F. 250
Ferguson, B. R. 1089
Ferguson, D. B. 1710
Ferguson, J. 2962
Fermepin, G. H. 2939
Fernan Zegarra, L. 2693
Fernandes Lima, C. B. 626
Ferrari-Sacco, A. 1162
Ferrer, J. F. 195,1511,1597
Ferreyra, M. E. 2224
Fey, F. 2001
Fichidzhian, B. S. 1439
Fiel, R. J. 1599
Field, J. B. 1396,2012
Fields, L. A. 2074
Fieldsteel, A. H. 1023,1601,
2596
Figge, D. C. 1957
Figueroa, M. E. 773,2906,2907
Filadoro, F. 1816
Finch, S. C. 1698
Finck, F. M. 201
Finegold, I. 1056
Fingerhut, B. 2697
Fini-Storchi, O. 1975
Fink, M. A. 552,1261,1278,
1810,2361,2593
Finkel, A. J. 24
Finkel, M. P. 770,931,2391
Finklestein, J. Z. 2639
Finney, J. W. 2197
Finster, M. 2539
Fiore-Donati, L. 368,597,845
Firez, A. 2668
Fischermann, K. 1332
Fischinger, P. J. 127,373,1609,
2080,2081,2868
Fisher, B. 193,293
Fisher, C. M. 2464
Fisher, E. R. 193,293
Fisher, H. L., Jr. 2525
Fisher, H. W. 2379
Fiske, S. 1830
Fitzgerald, G. R. 2351
Fitzgerald, J. E. 1961
Fitzgerald, P. H. 2192
Fjelde, A. 1197,1651
Flaks, A. 1725
Flaks, B. 33,754
Flamant, R. 2123
Flanagan, J. C. 2963
Flanders, L. E., III 2253
Fleetwood, H. O. 166
Fleissner, E. 2415
Fleming, W. B. 1084
Flesher, J. W. 2029
Fletcher, T. L. 699,700
Floyd, L. R. 743
Floyd, R. 2435
Foard, M. 1046
Foer, W. H. 257
Fogel, M. 2619,2883
Fogh, J. 346,1552,1911,2431,
2432
Foley, G. E. 1590,1994,2387
Follmann, E. 2703
Fölsch, E. 1124
Fondarai, J. 2848
Fontaine-Brouty-Boye, D. 370
Fonts, E. A. 1216
Foraker, A. G. 720
Forbes, I. J. 2723,2724
Forbes, P. D. 1711
Forbes, W. F. 77,2021
Forget, A. 1480
Forteza Bover, G. 2190
Fortna, H. M. 409
Fortuna, E. 628
Fossati-Guglielmoni, A. 628
Foster, A. G. 818
Foster, D. O. 2849
Foster, H. 1875
Foster, H. F. 782
Foster, R., Jr. 107
Fournet, L. F. 2467
Fox, B. 875
Fox, H. W. 1197
Fox, M. 419
France, L. H. 2656
Frank, A. S. 413
Frank, H. 783
Frank, H. K. 2000
Frankel, H. H. 745,1744
Franker, C. K. 1253
Frasca, J. M. 1212,1213
Fraumeni, J. F., Jr. 168,631,
975,1478,2147,2154
Frayssinet, C. 1741
Fredrickson, D. T. 52
Fredrickson, T. N. 246,363,702
Freedman, S. O. 427
Freeman, A. E. 1000
Freeman, A. I. 548,1062
Freeman, G. 98,829
Frei, J. V. 265,1194,1500
Friberg, S., Jr. 2108
Frickanisce, M. 1892
Fried, M. 1916
Friedell, G. H. 1489
Friedman, B. 434
Friedman, H. 123,1514,2401,
2599
Friedman, M. 794
Friedman, M. A. 988
Friedman, M. P. 2424
Friedman, R. M. 117
Friedman, S. B. 2339
Friedmann, G. 2233
Friend, C. 122,1026,1598,2344
Friskey, R. W. 1077
Frithiof, L. 2710
Fritz, R. B. 1819
Fritzon, P. 224
Fritzson, P. 1738
Fromme, H.-G. 1185
Frommes, S. P. 1269

Frosch, W. A. 1719
Frost, J. K. 1111
Frost, P. 337,2146
Froude, G. C. 1188
Fugmann, R. A. 1050,1870
Fujimoto, M. 657
Fujimura, S. 1714
Fujinaga, K. 2856,2884
Fujisawa, T. 857,1454
Fujita, S. 2449
Fukuda, A. 2633
Fukunishi, R. 759,1409
Fukuoka, F. 304
Fukushige, M. 766
Fukuyama, K. 1012
Fuller, J. L. 694
Fullmer, C. D. 1214
Fülöp, T. 146
Fumarola, D. 1760
Furiosi, N. J. 98
Furlaneto, J. A. 720
Furst, A. 1468
Furth, J. 237
Furuja, T. 2802
Füzy, M. 2757

Gabay, J. J. 925
Gabay, P. 2971
Gabridge, M. G. 1405,2259
Gabriel, C. E. 2130
Gács, G. 2981
Gadomska, H. 156,1317,1924
Gaffney, E. V. 1911,2431,2432
Gagna, C. 1073,1074
Gagné, W. E. 1740
Gahrton, G. 2387
Gaidar, E. I. 2912
Gaillard, J. 2241
Galibert, F. 1033,2860
Galich, R. 2929
Galikeev, Kh. L. 461
Gall, S. A. 2026
Gallager, H. S. 1805
Gallagher, C. H. 1747
Gallagher, J. C. 1940,2087
Gandagule, V. N. 634
Ganote, C. E. 983
Gantt, R. 2186
Garattini, S. 1633
Garbe, E. 2123
Garbut, A. 2324
García, G. 1623
Garcia Gancedo, P. 2818
García-Gutierrez, A. 2921
Garcia-Montelongo, R. 2126
Gardner, A. F. 1998
Gardner, D. 1482
Gardner, L. I. 181
Garfinkel, L. 71
Garner, F. M. 409
Garson, O. M. 2962
Gasse, H. 815
Gasser, M. 1843
Gaston, M. 1611
Gates, A. H. 2283
Gates, O. 932,933
Gatti, P. 2853
Gaugas, J. M. 2094
Gauger, J. U. 204
Gaughan, L. J. 2016
Gause, E. M. 966
Gavitt, F. 2414
Gay Prieto, J. 2818
Gayraud, J. 1066
Gazzolo, L. 2355
Gear, J. H. S. 1564
Geary, N. 1885
Gebauer, D. 202
Gebert, P. 709
Geering, G. 234,901,1815
Gefferth, K. 2482
Geglowski, W. S. 123
Gehle, W. D. 2385
Geissler, E. 2260
Gelboin, H. V. 1666,2332
Gel'bshtein, M. I. 882
Gelfand, M. 723
Gellin, G. A. 2732
Gelzer, J. 600,852
Genka, K. 1337
Gennaro, A. R. 613
Gentile, G. 808
Gentile, J. M. 2221
Gentile, S. L. 1964
George, T. W. 81
Georgescu, D. C. 648,2115
Georgii, A. 2382
Georgsson, G. 2816
Geraldes, A. 1034
Gérard-Marchant, R. 81, 1307,1324
Gerber, M. 2408
Gerber, P. 339,543,2107, 2753
German, J. 2964
Germi, S. 2768
Gerwig, T. 23
Gey, G. O. 426
Ghaffar, Y. A. 2171
Ghelelovitch, S. 2268
Ghezzi, I. 2541
Ghittino, P. 1421,2270
Ghosh, A. K. 1614
Giacometti, G. 570
Giani, E. 1322
Giannattasio, G. 627
Giao, N. B. 728,1495
Gibbs, F. 1597
Gibel, W. 316,2260
Gibley, C. W. 656
Gibson, R. W. 502,864
Gibson, S. R. 905
Gibson, W. 1884
Gieseke, J. A. 4
Gigon, P. L. 748
Gilbert, D. A. 1105
Gilchrist, C. 2094
Gilden, R. V. 355,1000,1002, 1003
Gilfillan, R. 2718
Gillespie, A. V. 1813
Gillespie, J. H. 562,1679
Gillette, J. R. 748
Gillies, M. 1934
Gillmann, H. 463
Gillot, F. 1799
Gilly, G. 1298
Gilly, L. 1298
Gimbo, A. 2833
Ginsberg, H. S. 143,2419,2424
Giordano, F. 2185
Giordano, R. 2847,2886
Giorgi, R. 2269,2790
Giovanardi, A. 2909
Giraldo, G. 492
Girardi, A. J. 1619
Girdwood, T. G. 1977
Gisin, S. 2079
Gist, C. 564
Gitsch, E. 1433
Giuliani, G. 730,1447
Glade, P. R. 340,772
Gladkovskaia, A. A. 714
Glasgow, L. A. 2339
Glass, A. G. 631,1639
Glass, R. M. 702,745,1744
Glazer, D. E. 551
Glenn, E. S. 836
Glenn, F. 2136
Glover, E. L. 708,1196,1737, 2536,2780
Glynn, J. P. 105,575,1039, 2078
Goarin, P. 2790
Goerttler, K. 2275
Goetschel, G. 2588
Goetz, I. E. 1230,1475
Gofman, J. W. 416
Goh, K. O. 664,2589,2719
Golcher, L. G. 2945
Gold, H. 434
Gold, M. 427
Gold, P. 427
Gold, R. H. 2216
Goldberg, A. F. 184
Goldblatt, P. J. 1121
Goldblum, N. 2888
Golden, R. L. 2634
Goldenberg, D. M. 13
Goldenberg, H. 2302
Goldenberg, V. E. 1328
Goldfeder, A. 1614
Goldie, W. 2936
Goldin, A. 2074
Goldman, B. 1108,2139,2955
Goldner, H. 2433
Goldner, R. 2469
Goldschmidt, B. M. 66
Goldschmidt, E. 632
Goldsmith, H. S. 27
Goldstein, G. 2105
Goldstein, J. A. 39
Goligher, J. C. 1118
Gomez, M. 577
Gomez-Barry, H. 2921
Gommi, B. W. 2539
González, G. 2818

Good, R. A. 580,581,1186,1547,
1801,2042
Goodall, C. M. 271,1665,1749,
2263
Goodner, J. T. 1079
Gordon, D. E. 120,1588
Gordon, W. 2526
Gorlin, R. J. 214
Gorrod, J. W. 295
Górski, T. 533
Gorski, T. W. 1095
Gosch, H. H. 2806
Gosse, C. 1339
Gössner, W. 753
Gottlieb, S. F. 481
Gottlieb, S. K. 2513
Goudy, B. 1477
Gould, R. G. 190
Gould, W. M. 2008
Govan, A. D. T. 1754
Grabar, P. 688
Grabska, J. 1816
Grace, J. T., Jr. 550,775,781,
1254,1591,1592,1600,2104,
2337,2338
Graf, T. 2609
Gräf, W. 707
Graff, S. 2697
Graffi, A. 333,1011,2001,
2758,2879,2900
Graffi, I. 1011,2879
Graham, A. J. P. 723
Graham, C. E. 2815
Graham, J. B. 2678,2969
Graham, R. 2969
Graham, S. 864
Gram, T. E. 748
Granados, R. R. 1923
Grande de Arruda, B. K. 626
Grande, J. 2551
Granoff, A. 1589,2636
Grant, G. A. 60
Grantham, P. H. 744,939
Graser, F. 2502
Grases, P. 387,388
Gravell, M. 1589
Gravelle, C. R. 792,2398
Gray, G. F., Jr. 2218
Greco, S. 1970
Green, G. M. 721
Green, H. 1818,2376
Green, M. 1553,1838,1992,
2638,2856,2884
Green, S. 985
Greenblatt, M. 274,2039
Greene, F. E. 748
Greenlaw, R. H. 1216
Gregor, O. 2134,2922
Gregoriades, A. 2626
Gregory, K. L. 2439
Gresser, I. 370,596,844,
1036,1250
Griel, L. C. 1272
Griem, W. 91
Griesbach, W. A. 2446
Griesemer, R. A. 1063,1064
Grieshaber, E. 315,2824
Griffin, E. R. 1809
Griffin, M. E. 2468
Griffith, G. W. 162
Grignon, G. 839
Grigorian, A. V. 1631
Grigorovich, N. A. 1440
Grimaud, R. 1729
Grimes, P. A. 2383
Grimley, P. M. 1060,2378
Grimmer, G. 84,329
Grinberg, K. H. 381
Griswold, D. P., Jr. 267
Grizzard, M. B. 1521,2861
Grob, K. 79
Groeschel, M. M. 1719
Grollman, S. 2780
Grönroos, J. 1116
Grönroos, M. 885
Gros, J. C. 1335
Gross, L. 604,692,789,1251,
1595
Gross, P. 2011
Gross, S. 1294
Grossbard, L. 525
Grossi, C. E. 950
Grossi-Bianchi, M. L. 2727
Grote, W. 2657,2658
Groulade, P. 790,791
Groupé, V. 2360
Grover, P. L. 749,1430
Groves, G. F. 1510,2603
Grube, D. D. 1493
Gruenstein, M. 2302,2570,2571
Grumbmann, M. R. 2586
Grundmann, E. 462,1918,2251
Grupper, C. 2720
Grzybowski, S. 1085
Guarino, A. M. 748
Guasta, G. 547
Gubareva, A. V. 254,934
Guerci, O. 483
Guérin, M. 1732,2183
Guha, A. 439
Guidi, G. 2706
Guillemain, B. 795,1040,1825
Guillon, J.-C. 2183,2830
Gulbert, A. 2329
Gunz, F. W. 1632,2143
Gupta, P. 1092
Gupta, S. 2950
Gurski, T. 937
Gusek, W. 957
Gustowski, A. 2686
Güthert, H. 1728
Gutmann, H. R. 1472,2561
Györkey, F. 1647
Gyure, L. 2198

Haas, R. 464,2890
Haase, A. T. 1559
Haasters, J. 2234
Habel, K. 684
Haber, S. L. 1089
Hacker, B. 2437
Hackett, P. L. 695
Haddad, R. 200
Haddow, A. J. 1287
Hadidian, Z. 702
Hadjiolov, D. 88,1236,2278
Hadley, H. G. 408,467,2726
Haemmerli, G. 198
Haerer, A. F. 153
Hageman, P. C. 130,1543
Hagopian, A. 1575
Hagstrom, R. M. 183
Haguenau, F. 843,1830,2083
Haguenauer, J. P. 2241
Hahn, E. C. 346
Haight, C. 2494
Hakama, M. 2948
Hakim, S. A. E. 959
Häkkinen, I. 1116
Hakomori, S. 1574
Hall, W. T. 1899,2361,2393
Halle-Pannenko, O. 2826
Halonen, M. 1182
Halpern, B. L. 2078
Halter, H. M. 75
Hamburg, V. 2898
Hamburger, J. I. 2690
Hameed, K. 1644
Hamerman, D. 1818
Hamilton, H. B. 1163
Hamilton, T. 50
Hamilton, T. H. 674
Hamlin, I. M. E. 176
Hammack, W. J. 1645
Hammon, W. M. 545
Hammond, E. C. 68,71,963,1094,
1095
Hammond, W. G. 423
Hampe, A. 1033
Hamre, D. 339
Hamtoft, H. 624
Han, I. H. 2076
Hanania, G. 2471
Hanche-Olsen, A. 1088
Hänichen, T. 869
Hara, K. 1828
Harada, H. 761,762
Harada, T. 1927
Harada, Y. 1404
Haran-Ghera, N. 787,2072,
2822,2823
Harap, E. 2520
Harbers, E. 317
Harding, J. D. J. 1795
Hardy, D. A. 2622
Hardy, E. P., Jr. 697,924
Hardy, W. D., Jr. 1815
Hardy, W. R. 544
Hare, W. C. D. 842,1014
Harke, H.-P. 717,719
Harket, R. 400
Harłozińska, A. 904
Harman, J. W. 2062
Harnden, D. G. 1648
Harnois, M. 565
Harper, P. V. 1179
Harrington, J. A. 352,999

Harris, C. 2313
Harris, H. H. 2760
Harris, J. W. 1652
Harris, M. 1675
Harris, P. N. 1476
Harris, R. J. C. 1670,2873
Harrison, E. G., Jr. 430
Harrison, Y. E. 2539
Hart, M. L. 1596
Hartley, J. W. 1886,2628
Hartmann, P. 1613
Hartmann, W. H. 191
Hartwich, G. 2330,2331
Harvey, E. 2385
Harvey, J. J. 1523,1524,1826,2094
Harvey, R. G. 1182
Hasegawa, K. 1851
Hasegawa, M. 1714
Hashimoto, Y. 38,2829
Haslam, S. 1900
Hasse, G. 817
Hasse-Berlin, W. 2660
Hasterlik, R. J. 24
Hattori, H. 2953
Hatziolos, B. C. 804
Haughton, G. 457,2312
Haupt, R. 385,1702
Hay, D. 563,1009,1010
Hay, R. J. 2835
Hayami, M. 2633
Hayford, A. H. 1844
Häyry, P. 1864,2430
Hays, E. F. 1605
Head, J. 2546
Heath, C. W., Jr. 1978,2174
Heath, J. C. 2290
Heberling, R. L. 355,1681
Heberman, R. B. 772
Hecker, E. 86,444,739,1199,
  1497,2527
Hedler, L. 1418
Hedman, B. 2920
Heege, E.-M. 1185
Heer, H. R. 2246
Heidelberger, C. 1240,1771,2811
Heimbach, R. D. 936,2013
Heine, U. 121,2082
Helgeland, K. 232
Hellman, A. 891
Hellman, K. B. 891
Hellstrom, H. R. 193
Hellström, I. 311,2722
Hellström, K. E. 311,2722
Hellström, P. Å. 2248
Helmboldt, C. F. 246
Henderson, J. S. 1496
Hengy, H. 2059
Henle, G. 342,344,1503,1504,
  1505,2101,2102
Henle, W. 100,342,344,464,
  1503,1504,1505,2101,2102,2911
Hennings, H. 2287
Henricson, B. 554
Henriksson, K. 816
Henry, M. 1249
Henry, P. H.
  2372
Henschen, F. 1362
Heppner, G. H. 2611
Herbeuval, R. 483
Heřmanský, F. 1347
Hermens, A. F. 2700
Hernes, D. 868
Herold, H. J. 2116
Hertig, A. T. 1099
Hertz, R. 1662
Hervy, T. 2951
Herzberg, J. J. 202
Herzberg, M. 2838
Hess, D. M. 569,2090
Hess, P. 919
Hesseldahl, H. 2976
Heston, W. E. 174
Heusghem, C. 2273
Hiasa, Y. 2277
Hickey, J. L. S. 22
Hicks, H. G. 188
Hien, D. P. 42
Hierowski, M. 1752
Higashi, J. 759
Higashinakagawa, T. 194
Higashino, S. 2484
Higgins, P. M. 962
Higgins, T. P. 950
Higginson, J. 394,520
Higuchi, T. 857
Hilbe, G. 2002
Hildebrandt, A. 329
Hilf, R. 54,276,2302
Hill, B. R. 1475
Hill, G. B. 2127
Hill, I. D. 1207
Hill, J. A. 168
Hill, J. T. 2271
Hill, M. J. 2809
Hill, R. H. R. 625
Hilleman, M. R. 835,836
Hillemanns, H. G. 420,1963,
  2507
Hilscher, H. 2260
Hinds, J. R. 2125
Hinuma, Y. 550,2104
Hinz, R. W. 338,559
Hiraki, K. 307,1035,2828
Hirao, F. 1454
Hirata, Y. 1428
Hirayama, T. 1635,1971
Hirohata, T. 879
Hirokawa, Y. 1823
Hirono, I. 93,94
Hirsch, M. S. 576,2094
Hirschhorn, K. 1719,2748
Hirschman, S. Z. 1610,2080
Hirshaut, Y. 340,772,1056
Hirshowitz, B. 1627
Hirt, B. 2650
Hirukawa, A. 857
Hitchcock, G. C. 2125
Hlavay, E. 1043
Ho, H. C. 1593,2106
Ho, M. 565
Hoch-Ligeti, C. 282,2199
Hodes, M. E. 116,588,841,1586
  2517
Hodge, H. C. 764
Hodgson, J. R. 2379
Høeg, K. 1956
Hoelzl Wallach, D. F. 2756
Hoffman, H. A. 2388
Hoffmann, D. 675,1132,1456
Hoffmann, U. 854
Hofmann, P. 429
Hofschneider, P. H. 464
Holaday, D. A. 2521,2522
Holdcraft, J. 1940
Holland, P. 2475
Hollander, C. F. 658,1232
Hollander, V. P. 1352
Hollinshead, A. C. 2892
Holma, B. 2248,2538
Holmes, E. C. 1465,2364
Holmes, J. M. 1784
Holmes, S. 1207
Holt, P. F. 1723
Holzner, J. H. 1433
Homburger, F. 65,67,907,1144,
  1448,1451,2321
Hongo, J. 2165
Hongo, T. 1169
Hook, W. A. 2350
Hopkins, M. S. 1905
Hopp, M. 86
Hopsu-Havu, V. K. 44
Horácěk, J. 383,2231
Hori, S. H. 2189
Horikawa, M. 2783
Horino, M. 1635
Horiuchi, S. 2802
Hormia, M. 2441
Horn, D. 69
Horn, K. H. 540,1011,1530,
  2879
Horne, M. K. 1798,2386
Horodniceanu, E. 647
Horoszewicz, J. S. 550,775,
  1592
Horváth, É. 1412,2777
Hoshino, K. 2175
Hoshino, T. 1698
Hoskins, J. M. 2844,2845
Hotta, S. 2623
Houston, W. 1087
Howard, E. B. 695
Howard, T. 1502
Howe, C. D. 602,848,1510
Howland, R. D. 2317
Hoy, W. E. 2463
Hozoc, M. 2631,2632
Hozumi, M. 2031,2558
Hrushovetz, S. B. 2696
Hsia, D. Y. Y. 1659
Hsiung, G. D. 2436,2635
Huang, C. C. 1594,2485
Hubbell, M. M. 1329
Huber, A. 151
Huber, P. 2240
Huebner, R. J. 353,355,1000,
  1002,1003,1509,1831,1886,
  2079,2212,2368,2396,2409,
  2410,2601,2608,2628
Huertas Tejada, G. 2693

Huggins, C. 954,2033
Hughes, L. E. 612
Hughes, N. R. 637
Hughes, P. E. 1401
Hughes, R. G. 1618
Hugoson, G. 816,1284
Hull, R. N. 1868
Hulme, G. W. 1098
Hulse, E. V. 1173
Humphrey, E. W. 1083
Hundeiker, M. 18,289,290
Huppert, J. 801,1037,2862
Hurst, L. 516,2280
Hurvitz, D. 2712
Huseby, R. A. 955,1653
Hussl, H. 2002
Husson, Y. 1943
Hutchison, G. B. 20,640
Hutterer, F. 2805
Hyams, L. 1076
Hyett, A. W. 1462

akovleva, L. A. 1508
akovleva, M. P. 636
annelli, S. 553
askovets, A. A. 945
aunsleinis, E. Ia. 1958
avorkovskii, L. I. 1958
bsen, K. H. 645
chikawa, Y. 2582
chimaru, M. 1698
dänpään-Heikkilä, J. E. 2207
de, G. 965
eb, Q. S. 2953
ftimovici, 2642
garasi, Š. 1230
ida, M. 1755
kawa, Y. 1823
keda, Y. 2802
kegami, R. 300,1438,1491,1837
kuta, F. 1452
m, M. J. C. 272
magawa, D. T. 1021,2402
mahori, S. 2411
mai, H. T. 1115
mai, K. 1759
mai, T. 1955
maizumi, T. 2067
mamura, M. 1281
mamura, T. 1594,2485
ndira, O. C. 2950
nfante, F. 1358
ngraham, R. L. 178,216
ngram, R. H., Jr. 1698
nnis, M. D. 1054
no, S. 147
nomata, M. 705
noue, T. 865,1950,2145,2829
nui, N. 980,1730
nvernizzi, F. 1441
oachim, H. L. 1258,1606
oannides, G. 160
orio, A. 1570
rino, S. 307,1035
rlin, I. S. 1827,2618,2620,2621
Irving, C. C. 1485,2064,2271
Isaka, H. 872
Ishibashi, Y. 212
Ishibe, T. 766,768,769,956
Ishii, K. 1636
Ishii, Y. 1316
Ishikawa, K. 2673
Ishikawa, S. 2137
Ishiko, T. 1230
Ishiwata, Y. 1427
Isojima, S. 1244
Issa, H. 1021,2752
Issekutz, B. 1350
Ito, A. 1695,1704
Ito, K. 1694
Ito, M. 2568
Ito, T. 1704,2229
Ito, U. 2277
Ito, Y. 356,358,587,827,
1260,2096
Itoga, T. 1698
Iurgutis, R. P. 1979
Ivankovic, S. 89,740,741,1727
Ivanov, S. S. 887
Iványi, P. 1314
Ivašková, E. 1314
Iversen, O. H. 221,400,733
Iversen, U. 733
Ivins, J. C. 1165
Iwai, Y. 1756
Iwata, R. 2165
Izard, C. 1720
Izard, J. 104
Izsak, F. C. 1437

Jackson, B. A. 46
Jackson, D. K. 778
Jackson, E. W. 663,2144
Jackson, F. C. 154
Jacob, A. 518,519
Jacob, J. 991
Jacobs, B. B. 955
Jacobsson, B. 508
Jacquignon, P. 728
Jagiello, G. 2776
Jainchill, J. L. 2370
Jakoubková, J. 1314
Jalan, K. N. 2195
Jamieson, J. D. 1212,1213
Jamra, M. 2146
Jandová, A. 2155,2940
Jänisch, W. A. 1241,1242,
1530,1728,2264,2265
Janis, R. 1646
Janss, D. H. 1772,2319
Järplid, B. 696
Jarrett, O. 563,1008,1009,
1010,1120
Jarrett, W. F. H. 406,563,
608,1008,1009
Järvi, O. 1116
Jasmin, C. 2345
Jasmin, G. 2252,2554
Jasty, V. 1566,2367
Jaszcz, W. 1571
Javadpour, N. 2666
Jayle, M.-F. 516,2280
Jeejeebhoy, H. F. 2095
Jellinck, P. H. 2028
Jenkin, R. D. T. 2662
Jenkins, R. S. 2679
Jenkins, T. W. 1902
Jensen, F. C. 833,1910,2645
Jensen, J. A. 1870
Jensen, K. E. 2110
Jensen, M. K. 418,466,665
Jensen, N. K. 555
Jensen, V. 1119
Jensson, Ó. 2942
Jerkofsky, M. A. 112,2420
Jerne, N. K. 464
Jim, R. T. S. 1072
Joffe, A. Z. 1461
Joftes, D. L. 2227
Jóhannesson, G. 1954
Johansen, H. 1332
Johanson, B. 508
Johns, L. W. 1252,2073
Johnson, A. G. 2076
Johnson, D. E. 8,270
Johnson, D. K. 1643
Johnson, E. A. 2276
Johnson, J. G. 2967
Johnson, K. G. 474,1163,1176
Johnson, L. D. 1099
Johnson, W. W. 1062
Joiner, E. 2719
Joklik, W. K. 2909
Jones, D. G. 2130
Jones, D. R. 430
Jones, E. W. 2774
Jones, F. E. 1944
Jones, H. W., Jr. 667,1109,
1110,1111
Jones, J. B. 941
Jones, R., Jr. 1591
Jordan, J. A. 2166
Jordan, R. 886
Jordan, S. W. 2157
Jordan, W. P., Jr. 207
Josey, W. E. 2099,2905
Jovanović, M. J. 811
Judah, J. D. 1663
Judge, J. R. 367
Juhász, J. 480,2006
Juhász, S. 1794
Juhls, H. 2262
Julian, C. G. 2168
Jull, J. W. 946,1477
Jung, H. D. 1306
Jung, J. K. 607
Just, G. 1198
Justh, G. 2701
Just-Viera, J. O. 2494
Jutz, C. 1495

Kada, T. 1363
Kadotari, H. 2449
Kagaya, Y. 28
Kahan, B. D. 1465

Kahle, P. 2562
Kahn, A. J. 2178
Kahn, M.-F. 2141
Kahn, R. H. 2814
Kahn, S. B. 1255,1256
Kaiser, R. 2504
Kaji, H. 2346
Kajima, M. 2412
Kajitani, T. 2137
Kakefuda, T. 1603
Kakita, S. 1929
Kakuk, T. J. 559
Kakunaga, T. 943,2784
Kaliss, N. 694,734
Kallenberger, A. 2716
Kalter, S. S. 594,1681,2878
Kamahora, J. 943,2784
Kambe, S. 1360
Kamei, H. 2462
Kamimura, N. 1635
Kaminetzky, H. A. 952
Kamitsuka, P. S. 1507
Kamiyama, R. 1635
Kampschmidt, R. F. 2182
Kanaar, P. 2516
Kanamaru, R. 2975
Kanda, K. 1635
Kandarkar, S. V. 63
Kane, K. 1635
Kanisawa, M. 2291
Kanisawa, S. 28
Kanka, J. 2680
Kannel, W. B. 65
Kantor, S. 2674
Kaplan, A. S. 2649
Kaplan, H. S. 1511,1889
Kaplow, L. S. 2436,2635
Kara, J. 825,1829
Karamova, E. R. 1545
Karande, K. A. 760
Karas, R. P. 2466
Karasaki, S. 2353,2564
Karasek, M. A. 2283
Karazas, N. 2875
Karika, Z. 2757
Karl, S. 2340,2341,2400
Karzel, K. 1966
Kasahara, S. 1856
Kasamatsu, T. 1634
Kaschak, M. 2011
Kasel, J. A. 340,772,1559
Kasparek, K. 2970
Kasperowicz, Z. 2686
Kastelan, A. 136
Kaštelan, S. 2652
Kasten, F. H. 1479
Katagiri, K. 1404
Katagiri, M. 1027,2343
Katayama, K. P. 1109,1112
Kato, K. 1861
Kato, R. 2533
Kato, T. 2953
Katsuki, H. 965
Katz, C. 2286
Katzenellenbogen, I. 1326
Katzman, H. 2762
Kaufman, R. J. 2068
Kaufman, S. 1048
Kauii, T. 181
Kaump, D. H. 1961
Kavaklieva-Dimitrova, I. 867
Kawachi, T. 1428
Kawai, K. 2449
Kawaji, K. 759
Kawamura, Y. 2854
Kawashima, Y. 147
Kawazoe, Y. 97,2530,2782
Kawinski, W. 2384
Kaye, A. M. 35,36
Kazama, K. 857
Kazuta, M. 766
Keasbey, L. E. 201
Keast, D. 788,2740
Keen, T. E. B. 1722
Keenan, R. G. 1464
Keighley, E. 1312
Keller, H.-P. 2749
Kelley, V. C. 1328
Kelly, D. F. 646
Kelly, M. G. 92,175,321
Kempson, R. L. 31
Kendall, T. E. 2765
Kendrey, G. 523,716
Kensler, C. J. 1869
Keppie, J. 438
Kern, J. 355,1000,1002,1003
Kersting, G. 2977
Kese, G. 895,2169
Kessel, H. 751,2562
Keston, A. S. 1012
Khadzhiev, S. 867
Khairallah, L. 446
Khaletskaia, F. M. 2553
Khalifat, R. 2471
Khodosova, I. A. 284
Khokhlova, M. P. 1958
Khoobyarian, N. 2087
Khoury, G. 1583,2895
Khristov, K. 488
Khrustalev, S. A. 644
Khundanova, L. L. 979
Kidwai, J. R. 1862
Kieler, J. 197
Kiersnowska, B. 1700
Kiese, M. 43
Kiessling, J. 2663
Kihlman, B. A. 2532
Kikuchi, Y. 951
Kikui, M. 1438
Killmann, S.-A. 1102,1103
Kim, C. S. 2878
Kimura, I. 358,2829
King, C. L. 1408
King, C. M. 1486
King, G. S. 1261
King, R. J. B. 431
King, V. 2308
Kingsley, W. F. 1194
Kinnman, J. 921
Kinnman, J. E. G. 2692
Kinosita, R. 1230,1475
Kinser, R. E. 1464
Kinzel, V. 874,2065
Kiossoglou, K. A. 1982,1987
Kirchmyer, R. 107
Kirikae, I. 1936
Kirman, D. 71,1215
Kirsch, N. 2017
Kirschstein, R. L. 566,1248,
 1917,2086,2374
Kirsner, J. B. 878
Kirsten, W. 1885
Kirsten, W. H. 126,605,847,
 1516,1821
Kisch, A. L. 2850
Kiselev, N. A. 2651
Kisia, I. A. 2926
Kissen, D. M. 1660
Kit, S. 831,1584,2647,2741,
 2882
Kitagawa, M. 1359,1363
Kitajima, K. 2828
Kitamura, H. 1058
Kitano, M. 1445
Kitchen, D. A. 2060
Kizer, D. E. 1761,2328
Klaiber, M. S. 2571
Klauber, M. R. 651,663,1292,
 2144
Klein, E. 1197,1504,2108,
 2347,2866,2867
Klein, G. 236,539,1504,1505
 2105,2911
Klein, H. J. 2970
Klein, K. 2132
Kleinfeld, M. J. 1668
Kleinsasser, O. 2233
Klimanskii, V. A. 2930
Klinger, M. E. 407
Klion, F. M. 2805
Klug, A. 2651
Kmetz, M. E. 1272
Kniazeff, A. J. 1678
Knight, S. C. 2622
Knorr, M. 324
Knoth, M. 2976
Knowles, B. B. 833
Knox, B. E. 2483
Knox, J. F. 1207
Knox, W. E. 2450
Kobayashi, H. 1365,2346
Kobayashi, K. 2802
Kobayashi, N. 965
Kobuna, I. 304
Kobune, F. 2633
Kodama, M. 491,589,705
Kodama, T. 589,1365,2346
Koga, K. 1316
Kohgo, K. 2802
Kohler, B. E. 2361
Kohn, G. 344
Kojima, K. 589
Kojo, Y. 857
Koldovský, P. 464,1264,1314,
 2595
Kolesnichenko, T. S. 285,2548
Koller, P. C. 2813
Kołodziejska, H. 855

olycheva, N. I. 609
ölzsch, J. 1306
omitowski, D. 534
ondo, M. 2566
ondrat'eva, A. F. 2496
onečný, L. 384
onikov, N. F. 31
onishi, Y. 1426,2277
oniukhov, A. F. 2602
onn, M. 550,2104
onno, Y. 1424
onovalova, N. P. 2618
oprowska, I. 297,2196,2323
oprowski, H. 464,833,1908, 2645
ori, Y. 2449
orobkin, M. 495
orobkin, M. T. 1980
orosteleva, T. A. 977
orzis, J. 2801
osa-Brunet, M. 1803
osenow, W. 2961
oss, L. G. 219
oszarowski, T. 156,1924
othari, M. L. 10
othe, W. 2769
otler, M. 787
otrikadze, N. G. 1587
ottaridis, S. D. 363,823, 824
ouri, R. E. 1582
ourie, F. M. 881
ourilsky, F. M. 405
ovács, K. 511,1412,2777
ovalev, A. G. 887
ovaleva, I. G. 1330
ozlova, L. E. 2477
ozlov, M. Ia. 862
ozłowska, A. 2968
ajtmajer, G. 2528
akoff, I. H. 828
amer, J. H. 2099
amer, S. 481
aus, P. 383
auss, S. 1983
eider, J. W. 2098,2425
en, V. 1346
enová, D. 1346
essin, J. 410
eyberg, L. 226
ieg, K. 510,2267
iegel, H. 698
ishan, A. 1912
ispin, M. 1437
iukova, I. N. 1528
ivit, W. 1980
ivolapchuk, O. Ia. 1508
öger, H. 751,2562
oh, H. 2817
öll, W. 386
ompotic, E. 2973
onman, B. S. 422,423
üger, H. 410
ugljakova, K. E. 2477
ush, A. J. 910,1976
ylova, N. V. 1330

Kryukova, I. N. 1044,2876
Kshivan'ska, E. 937
Kuff, E. L. 1013,1873
Kuhlmann, W. 1185
Kühn, H. 1702
Kujumgiev, I. 529
Kukaine, R. A. 2869
Kulka, F. 417
Kumanishi, T. 1529
Kume, F. 29
Kumkumadzhian, V. A. 1439
Kung, T. 1871,2413
Kunkel, H. G. 1158
Kunte, H. 323,940,2272
Kuntzman, R. 1429,2316,2795
Kupel, R. E. 1464
Kupfer, G. 2262
Kupfer, M. 2262,2307
Küpferling, E. 2675
Kurcz, M. 511
Kuretani, K. 657,767
Kurimura, T. 2647
Kurita, Y. 710,1260,1787, 2037,2043
Kurland, L. T. 1071
Kuroda, K. 2803
Kuroda, Y. 1049
Kurohara, S. S. 2678
Kuroki, T. 273
Kurpios, J. 1285
Kuschner, M. 683,1964
Kutinová, L. 347,2641,2840
Kutscher, W. 327,328
Kutschera, H. 396,2002
Kuz'mina, E. G. 659,2714
Kuznetsov, O. K. 1534,2610
Kuznezova, L. E. 2035,2529
Kwan, H. C. 1593,2106
Kwon, S. H. 252
Kyle, R. A. 1071
Kyriakos, M. 31

Labas, Z. 2709
Lacassagne, A. 516,728, 1356,2280
Lacour, F. 812,2354,2604
Lafarge, C. 1741
Lagache, G. 2172
Lagerlöf, B. 1170,1171, 1706,1707
Laine, F. 2708
Laird, H. M. 563,1008, 1009,1010
Lakhanpal, U. 165
Lamb, D. 2019
Lamberson, H. V. 1897
Lamensans, A. 601,853
Lamerton, L. F. 1367
Lampe, I. 669
Lampert, F. 204,2960
Lampkin, B. C. 2754
Lancaster, L., Jr. 2467
Lancaster, M. C. 1225
Lance, P. 2728
Landing, B. 1369
Landschütz, C. 738,1674
Lane, W. T. 1562,2409
Lange, R. D. 1254
Langford, P. L. 377
Langham, R. F. 559
Langham, W. H. 1696
Langlois, A. J. 1819,2082
Langseth, L. 66
Langvad, E. 332,2170
Lapin, B. A. 1508
La Placa, M. 1865
Laqueur, G. L. 93,94,1146, 1718,1784
Larsen, A. L. 1976
Larsen, C. J. 2630
Larsen, J. F. 2976
Larson, P. S. 1
Larson, V. L. 809
Larson, V. M. 835,836
LaSalle, B. 1657
Lasanta, J. 1368
Lasfargues, E. Y. 376,378, 1901
Lasfargues, J. C. 376
Lasheret, J. 1519
Laskin, S. 964
Laskowski, T. Z. 2689
Lasneret, J. 2832,2870
Lasnitzki, I. 435,2024
Lasserre, O. 2123
Latimer, R. G. 188
Lattermann, K. 2443
Lau, H. U. 469
Laurent, Y. 930
Lausch, R. N. 1282,1573,2288, 2429
Lauslahti, K. 2947
Lavenda, N. 1358
Laver, W. G. 2917
La Villauroy, C. J. 1335
Law, L. W. 128,129,1151,1522
Lawley, P. D. 681
Lawrence, C. H. 57
Lawrence, J. H. 2230
Lawrence, S. S. 784
Lawson, L. J., Jr. 24
Lawton, J. M. W. 2723,2724
Layman, D. L. 2055
Layne, S. 2429
Lazar, P. 815,1732
Lazarus, H. 1590
Lazurkina, V. D. 862
Leaf, D. 1472
Leaver, D. D. 522,2049
Le Baron-Marano, F. 1720
Le Borgne De Kaouel, C. 2335
Lebrun, J. 930
Leclerc, J. C. 1822,2594
Leclere, M. 839
Lederer, B. 317
Ledin, G., Jr. 1468
Ledinko, N. 1846,1905
Lee, A. E. 118
Lee, A. M. 1478
Lee, B. C. 2692
Lee, B. K. 2537

Lee, C. W. 982
Lee, D. J. 1226,1227,2585
Lee, D. K. 1640
Lee, J. 1978
Lee, K. M. 562
Lee, K. P. 2851
Lee, Y. T. 2692
Leech, J. 1913
Lefkowitz, S. S. 350,1006,1560
Legator, M. S. 1405,2259
Leger, L. 473
Legerlotz, C. 1097
Legrand, E. 2243
LeGuerrier, J. M. 774
Lehmann, L. 1751
Lehner-Netsch, G. 2721
Lehrer, L. 2932
Leighton, J. 1121,2701
Lelikova, G. P. 424
Lemberg, V. K. 485
Lemerle, J. 1324
Lemon, H. M. 2149
Lennette, E. H. 354,2348
Leonard, A. 374
Leong, J. L. 266,1187,1453
Le Page, R. N. 2274
Lepper, M. H. 2932
Lerner, E. L. 1631
Lerner, L. J. 276
Le Roux, B. T. 1331
Lesca, P. 2249
Lesko, S. A., Jr. 2032
Leslie, G. 2406
Lesobre, R. 395
Leuchtenberger, C. 2020,2311
Leuchtenberger, R. 2020,2311
Levan, A. 1340,1841
Levenbook, I. S. 1845
Levenbuk, I. S. 1563
Levi, P. E. 2451
Levij, I. S. 299,726,871, 1450,2285
Levin, A. G. 2108
Levin, M. J. 2372
Levin, M. L. 864
Levin, W. 1429,2316,2795
Levine, A. J. 143
Levine, A. S. 1604,2372
Levine, E. M. 893
Levine, M. K. 1304
Levy, B. 2366
Levy, B. M. 571
Levy, J. A. 1057,1503,1886
Lévy, J. P. 1822,2594
Lewis, A. M. 2368
Lewis, A. M., Jr. 902
Lewis, G. 1795
Lewison, E. F. 1112
Lherisson, A. M. 2848
Li, C. P. 1004,2421
Li, F. P. 2147
Liavåg, I. 671
Libánský, J. 598,850,1264
Libby, P. 1789
Libermann, C. 1732
Liciu, F. 95
Liebelt, A. G. 179,377, 1548,1616,1791
Liebelt, R. A. 179,377,1548, 1616,1791
Lieberman, M. 1889
Lienhard, C. P. 2939
Lightman, E. 723
Lijinsky, W. 271,1742,1749, 1762,2250,2791
Likhachev, A. Ia. 1160
Lilienfeld, A. M. 864
Lille-Szyszkowicz, I. 2971
Limbeck, G. A. 1328
Lin, C. D. 2175
Lin, F. H. 124
Lin, J. K. 1763
Lin, P. 1014
Lindberg, L. G. 1526
Lindemann, J. 198
Linden, G. 2128
Linder, E. 2713
Linder-Horowitz, M. 2450
Ling, K. H. 1796
Ling, N. R. 2622
Links, J. 130
Linnik, A. B. 286
Liombart, A., Jr. 2576
Liozner, A. L. 2859
Lipkovic, P. 2687
Lippi, L. 1975
Lippincott, S. W. 472
Lipworth, L. 2158
Lisa, J. R. 449
Liss, L. 2325
Lissenko, N. I. 2912
Little, J. B. 928
Liu, L. B. 2276
Liu, P. I. S. 2322
Liverud, K. 1629
Lloyd, B. J., Jr. 551,1038
Lloyd, J. W. 2154
Lloyd, M. K. 2793
Lloyd, W. 2522
Locker, J. 1121
Lockhart-Mummery, H. E. 1117
Loewenstein, W. R. 2484
Löffler, H. 1843,2751
Log, T. S. 2608
Lohe, K. 203
Lohs, K. 316,2260
Loke, Y. W. 2193
Lokhvitskii, S. V. 1631
Lombard, L. S. 409
Lombardi, G. 2654
Lombardi, L. 2305
London, W. T. 1671,2490
Loosmore, R. M. 1795
Lopez-Corella, E. 649
Lorans, G. 2369
Lorenz, K. 709
Lorenzo Valles, J. 2684
Lotlikar, P. D. 1764
Louisot, P. 440
Love, L. 2665
Loveless, J. D. 2432
Lovino, G. 1970
Lowell, D. M. 475
Lower, G. M., Jr. 1766,2036, 2327
Lowery, R. S. 436,437,438
Lowry, J. 2320
Lozac'hmeur, M. T. 2244
Lucas, L. A. 2717
Luchnik, N. V. 659
Lucis, O. J. 1005
Lucis, R. 1005
Ludwig, A. S. 2508
Ludwig, F. C. 454
Lueders, K. K. 1013,1873
Luginbühl, H. 2694
Luginbuhl, R. E. 363,823, 824,1676
Luis, O. H. 1293
Lundin, F. E., Jr. 2522
Lungeanu, A. 1859
Lungu, M. 2631,2632
Luria, S. B. 475
Lusignani, A. 2572
Luthra, U. K. 2156
Lynch, G. A. 2152
Lynch, H. T. 910,1323,1976, 2225
Lynch, J. R. 1464
Lynn, J. A. 206,2197
Lyons, M. 2413
Lyons, M. J. 2424

Maag, T. 2437
Maaløe, O. 464
Maass, G. 2890
Maass, H. 677
MacDonald, E. J. 622
MacDonald, W. E. 763
Macedo Macedo, E. 619
Mach, O. 598,850
Machala, O. 1535
Machiguchi, H. 1835
MacIntyre, E. H. 1807,1852
MacKay, E. N. 621,1300
MacKintosh, T. F. 1977
MacLean, N. 1973,2195
MacMahon, B. 1297,2215
MacPherson, I. 1120,2368, 2377
Madden, R. E. 2198
Madoń, J. 1752
Madsen, P. O. 2733
Maeda, K. 1316
Magaraggia, Di L. 1126
Magee, P. N. 1410,1664,2049
Magnusson, P. 2911
Magris, D. 616,1621
Maguire, R. 2026
Maher, V. M. 1402
Mahler, D. 1627
Maier, I. 1166
Majima, T. 1432,2165
Mak, S. 2884
Mäkelä, O. 1692
Makino, S. 2623
Malanina, V. N. 1958

alaskovȧ, V. 1264
aldague, P. 2759
alejka-Giganti, D. 1483
ali, S. 2156
alinin, G. I. 2597
alinoski, V. F. 2439
allet, L. 2333
alling, H. V. 1797
almgren, R. A. 115,360, 1061,2393
almquist, W. A. 1274
altzeff, N. 2559
alý, E. 2528
amuro, T. 1178
ancinelli, S. 1645
ancini, L. O. 1566,2367
andel, L. R. 2437
andelstam, P. 2320
anderson, W. G. 856
ann, J. D. 1348
ann, K. 2135
anning, J. S. 1898
annini-Palenzona, A. 1865
anoilov, K. 2133
anolov, G. 1340
anouvrier, R. 1205
antel, N. 702,1127,1639,2142
antovani, A. 808
ányi, G. 146
arantz, C. 2465
aranzana, P. 2541
arcato, P. S. 808
archegiani, M. 2819
archiolo, B. 2235
arco Orts, F. 2190
arcozzi, G. 2512
arcuccio, L. 1760
arczynska, B. 2414
ardjono, M. 1068
areel, M. 199
arhold, J. 2583
ariani, T. 2403
arigo, C. 2146
arin, G. 2377,2847,2886
arinuzzi, A. 1620,2653
ark, J. 1527
ark, R. 2701
arkam, S. 1068
arkert, C. L. 460
arkovic, V. 1951
arquardt, H. 706
arquardt, P. 1418
árquez-Monter, H. 150
arsh, M. F. 910
arshak, R. R. 244,813
artin, C. E. 1000
artin, J. H. 206
artin, M. A. 2371,2380
artin Gomez, A. 1175
artineau, R. G. 475
artinez, L. 1547
artinez, I. 1625
artinez-Palomo, A. 2089
artino, E. C. 1004,2421
artinson, F. D. 1301
artirosian, D. M. 381
Martuzzi, M. 2946
Martynenko, B. F. 639
Martyré, M. C. 2826
Marugami, M. 2277
Maruyama, K. 857,1806,1874
Marzot, G. 629,630
Mashiach, S. 1988
Mason, R. 1913
Mass, N. 2138
Mass, R. E. 784
Massaro, D. 200
Masters, F. W. 2765
Masuda, K. 414
Masuda, Y. 1456
Masukawa, T. 147,1112
Matarazzo, R. 2670
Mateos Cándano, M. 2237
Mateu-Aragonés, J. M. 2685
Mathé, G. 106,780,2335,2345
Matheisz, J. 1914
Mathison, J. B. 2279
Mathot, C. 1028
Matras, H. 2789
Matrka, M. 2583
Matsen, F. A., III 2366
Matsuba, M. 1756
Matsumoto, M. 306
Matsumoto, S. 1946
Matsunami, T. 1178
Matsushima, T. 304,1765
Matsuura, K. 1557
Matsuya, Y. 2376
Matsuyama, M. 2037,2044
Mattern, C. F. T. 1847
Mattosinho França, L. C. 2707
Mauch, P. J. 2763
Mauer, A. M. 2754
Maurer, B. A. 1594
Mauro, F. 16,17,26
Maximos, A. 323,840
May, P. 2392
May-Levin, F. 2604
Mayeda, K. 1699
Mayer, A. M. 2792
Mayer, L. 1885
Mayer, L. A. 605,847
Maynard, E. A. 764
Mayyasi, S. A. 782,1875,2077
Mazurenko, N. P. 336,2602
Mazzarella Farao, O. 1959
McAllister, R. C. 1000
McAllister, R. M. 2368,2639
McArn, G. E. 402
McCaffrey, R. M. 2164
McCalla, D. R. 703
McCarthy, C. F. 1926
McClelland, R. 2873
McCombs, R. M. 1521,2861
McConnell, T. S. 661
McCormack, L. J. 1641
McCoy, J. 1885
McCoy, J. L. 105,575, 1039
McCullough, J. J. 1980
McCutchan, J. H. 832
McDivitt, R. W. 2218
McDonough, M. 2045
McFarlane, E. S. 349,1005, 1561,2613
McFeely, R. A. 842
McGandy, R. B. 928
McGehee, M. P. 1874
McGilvray, E. 525
McGlashan, N. D. 960
McGowan, J. H. 1793
McGrath, J. T. 2694
McGrew, E. A. 2546
McGuire, P. 211
McGuire, W. L. 99
McIntire, K. R. 573,1767
McKee, L. C. 196
McKinnell, R. G. 590,2111
McKinney, G. R. 47
McLean, A. E. M. 960,2799
McLean, E. P. 758
McMahon, N. J. 2717
McNary, J. 756
McNeal, J. E. 1319
McQuarrie, D. G. 1083
McSherry, C. K. 2136
McSwain, B. 2949
Meadors, M. P., Jr. 2481
Meara, R. H. 486
Meary, R. 2979,2980
Medina, D. 137,1768
Meeker, W. R., Jr. 1904
Meezan, E. 2426
Meier, H. 2396
Meisels, A. 2456
Meites, J. 283,1902
Melchionne, S. 2286
Mella, M. 1969
Mellman, W. J. 344
Mello, A. 2226
Mello, N. R. 2226
Mellors, R. C. 899,2601,2743
Melnick, J. L. 140,595,691, 773,2906,2907
Melnyk, J. 1349,1369
Meloan, S. N. 1769
Mendecki, J. 2487
Mendez, D. P. 387,388
Mendez, W. M. 32
Mendoza Valcarcel, L. 2693
Menz, H. P. 2569
Menzies, R. C. 2192
Meranze, D. R. 1198,2302, 2433,2570,2571
Merchant, J. A. 617
Merekalova, Z. I. 336
Mering, L. G. 636
Merkow, L. 348,567,568,1007
Merle D'Augibné, R. 2978
Méry, A. M. 2830
Meschino, S. 389
Metcalf, D. 107
Metzgar, R. S. 998
Meunier, M. 518
Meurman, L. O. 915
Meyer, A. T. 103
Meyer, G. 995,2390,2848
Meyer, J. S. 2959

Meyer, P. B. 1202
Meyer, R. 253
Meyer-Bertenrath, J. G. 1731,2737
Meyskens, F. 1652
Meytes, D. 2139
Michaels, L. 922
Michalas, S. 2173
Micheau, C. 1307
Micheel, B. 1512,2627
Michel, I. 2302
Michelson, S. F. 2083
Michot, F. 1757
Mickey, M. R. 1434
Middleton, P. A. 99
Mignot, J. 2244
Mihailovich, N. 259,260,1193
Mihich, E. 195
Mikhailov, V. Ia. 2676
Miki, Y. 1305
Millar, J. D. 8,270
Millard, R. E. 176
Miller, B. S. 402
Miller, D. G. 794
Miller, E. C. 755,1142,1402, 1406,1484,1763
Miller, J. A. 755,1142,1402, 1406,1484,1763
Miller, O. 525
Miller, R. W. 152,167,168, 1687,2213
Millian, S. J. 108
Milner, J. E. 2557
Milt, H. 2220
Miluničová, A. 2155,2940
Minami, A. 414
Minami, Y. 1635
Minc, B. 2487
Minkler, J. L. 416
Minowada, J. 341,1914
Minton, J. P. 2428
Mints, I. M. 1398
Mira, O. J. 2405
Mirand, E. A. 781,1025,1254, 1600,1879,2337,2338,2342
Mirocha, C. J. 1183,1229
Miroff, G. 1897
Mironescu, K. 95
Mironescu, S. 95,2800
Mirvish, S. S. 2739
Mishra, S. K. 536
Mishrick, A. 415
Misiewicz, L. 398
Mistry, P. B. 760
Mita, T. 425,2530
Mitchell, B. S. 2139
Mitchell, G. W., Jr. 662,2458, 2718
Mitchell, J. R. 338
Mitchell, J. T. 2188
Mitchell, K. G. 1795
Mitchell, R. I. 4
Mitoma, C. 41
Mitsuya, H. 2489
Mittelman, A. 775
Mitus, A. 484
Mitus, W. J. 1982,1987
Miura, M. 1446
Miyakawa, M. 1927
Miyake, M. 303
Miyake, T. 358
Miyaki, K. 28,984,2803
Miyamoto, M. 1769
Miyamoto, S. 1466
Miyata, H. 926,1699
Miyawaki, H. 2612
Miyoshi, I. 1035
Mizell, M. 1261,1866
Mizoguchi, M. 766
Mkheidze, D. M. 2859
Mobbs, B. G. 279,1770
Möckel, P. 2262
Modan, B. 403,1069,1108, 1286,1626,2138,2139,2955
Modan, M. 1108,2955
Mody, J. K. 2578
Moggian, G. 2946
Mohan, L. 744
Mohr, U. 874,911,2065
Mohran, Y. 2171
Mokuno, J. 865,2145
Moldovanu, G. 794
Moldow, R. E. 1080,1978
Mole, R. H. 1173
Moll, T. 818
Mollier, M. F. 601,853
Moloney, J. B. 109,578,579, 1275,2349,2868
Moloney, W. C. 2308
Monat, Y. 2979
Mondal, S. 1771
Monjour, G. 2790
Monjour, L. 2269
Monneron, A. 1741,2563
Monov, N. 2117
Monroe, J. H. 2077
Monsiorski, J. 2686
Montagna, W. 1191
Montagnier, L. 2093,2390
Montalvo, D. A. 966
Montesano, R. 1220,1777
Montgomerie, J. Z. 1800
Montgomery, P. O'B. 2030
Monti-Bragadin, C. 197
Monus, Z. 417
Moon, R. C. 262,1772,2025, 2319
Moore, A. E. 794,1685
Moore, C. O. 2081
Moore, D. H. 376,378,1896
Moore, G. E. 65,73,205,343, 1058,1914,2462,2485
Moore, M. 757
Moorhead, P. S. 1991
Mor, C. 627
Morando, G. C. 880
Morat, G. 440
Morawetz, F. 2933
Morecki, R. 771
Morgan, H. R. 1537
Morgan, J. M. 159
Morgan, W. D. 175
Morgenfeld, M. C. 866
Mori, K. 2566
Morita, R. 1635
Moriya, J. 307
Morowitz, D. A. 878
Morreal, C. E. 1408
Morris, H. P. 2450,2486,2711
Mortimer, R. H. 1206
Morton, D. L. 1061,1465,2364, 2393
Morton, J. F. 1223
Morton, J. I. 2600
Mosca, A. 1959
Moscovici, C. 1820,2606
Moscovici, M. G. 2606
Moses, H. L. 340,772
Moshy, R. J. 75
Mosse, H. 2318,2797
Mostofi, F. K. 2666
Motoi, M. 1554,1555,1556
Motoji, H. 1635
Motomura, S. 1985,1986
Motta, R. 106
Mouledoux, A. M. 2279
Moulton, J. E. 1740,2253
Mouriquand, C. 1834
Mouriquand, J. 1834
Moutaffian, M. 995
Moy, R. A. 339
Mugera, G. M. 2161
Mühlbock, O. 133,173,2363, 2590
Mukherjee, A. L. 1842
Mulay, A. S. 2054
Mulay, I. L. 2483
Müller, W. 1091
Mullick, S. 2718
Mullins, J. F. 2016
Munk, K. 465
Muñoz, N. 1247,1933
Munroe, I. 2413
Munroe, J. S. 1871
Munsick, R. A. 2157
Munson, B. 1877
Müntener, M. 2511
Munube, G. M. R. 1809
Murakami, S. 2165
Murakami, T. 2566
Muramatsu, M. 194,2177
Murano, T. 1950
Murphy, E. D. 953
Murphy, G. 2537
Murphy, W. H. 2076
Murray, R. K. 446
Murthy, H. S. R. 536
Mustea, I. 2804
Mutavdzic, M. 1951
Mutchnik, D. L. 2689
Myers, B. 1805
Myers, D. D. 2396
Myers, R. E. 2090

Nabokov, Sh. A. 882
Nachtigal, M. 1859
Nachtigal, S. 1859

adareishvili, A. E. 1587
adel, E. M. 2581
adkarni, J. J. 1504
adkarni, J. S. 1504
adler, H. L. 1659
adtochey, G. A. 2643
agai, S. 2584
agaki, D. 1851
agano, D. 2187
agao, M. 1714
agao, T. 2828
agasawa, H. 657,767,1436
agashima, T. 1856
agata, C. 491,705
agayama, R. 2953
agayeva, L. I. 2869
agayo, T. 2568
agendra, M. 1945
agy, I. 1343
ahmias, A. J. 2099,2905
aib, Z. M. 2099,2905
aji, A. F. 2766
akagawa, S. 1835
akahara, W. 425,1811,1812, 2070,2782
akai, M. 1021,2402
akakuki, K. 2612
akamura, K. 1636
akamura, T. 2044
akanishi, T. 1634
akata, Y. 1517,1518
amba, M. 2187
amer, M. 1288
amkung, M. J. 699,700
andi, S. 1052,1544,1900
aora, N. 1363
apalkov, N. P. 288,1411
apoli, A. 1322
ara, K. 2239
ardi, E. 2472
ars, P. W. 2509
asiell, M. 1210
asjleti, C. E. 1708
astac, E. 2631,2632
aujoks, H. 2506
azerian, K. 1531
derito, P. 2161
eal, J. 2050
eher, G. H. 2600
eiman, J. M. 731
eimann, J. L. 483
eishtadt, E. L. 1345
ell, M. A. 1844
elson, D. S. 2463
elson, G. H. 1183,1229
elson, R. 1474,2034
émeth, I. 1794
enquin, G. 713
eriishi, S. 1163
eubauer, R. 2410
eumann, G. 2140
eumann, H. A. 2665
ewberne, P. M. 1149,1233, 1239,1745
ewman, J. T. 2385
Newman, W. C. 262,2025
Ngo-Quang-Binh 876
Niaussat, P. 1715,2333
Nichols, W. W. 1841
Nicholson, S. F. 428
Nickerson, R. J. 1099
Nicoloff, D. M. 1083
Nicolson, M. O. 2368
Niculescu-Davăz, I. 1691
Nieburgs, H. E. 1338
Niederman, J. C. 1505
Nielsen, A. H. 792,1893,2405
Nielsen, G. 1658
Nielsen, M. 632
Nigro, N. 1803,1857
Niitsuma, A. 2038
Nikaido, O. 2783
Nikulin, A. 2238
Nilsson, A. 479
Nishihara, E. 1704
Nishimura, E. T. 2406
Nishimura, R. 1221,2326,2549
Nishiyama, H. 865,1950,1984, 2145
Nishizuka, Y. 710,2037,2043, 2612,2735
Nitze, H. R. 1965,2298, 2299,2300
Niu, L. C. 439
Niu, M. C. 439
Noble, J. G., Jr. 2581
Nobrega, F. T. 1071
Nomoto, K. 2294
Nordenskjöld, B. A. 828,1568
Nordquist, R. E. 1894
Noro, L. 1208
Noronha, F. 562
Norris, C. M. 972
Norris, F. D. 663,2144
Norris, H. J. 2447
North, J. D. K. 1800
Nosny, P. 2708
Novak, G. M. 2665
Novak, J. R. 335
Novelli, G. D. 891,2061
Novoa, R. J. 387,388
Novotná, O. 598,850
Nowell, P. C. 2486
Nowotny, K. 2769
Nowotny, P. 1125
Noyes, W. F. 992
Nugmanov, S. N. 609,1622
Nusbacher, J. 2748
Nyfors, A. 1724

Oboshi, S. 1027,2343,2827
O'Brien, P. A. 1031
O'Brien, R. L. 2644
Obrzut, D. 1700
Obuch, I. B. 1044,2876
Obukh, I. B. 1528
O'Connor, T. E. 372,1891,2080, 2081,2593,2868
Oda, K. 1860
Oda, T. 2180
Odaka, T. 2825
Odashima, S. 2567,2580
Oettel, H. 1455
Oettgen, H. F. 234,758,901
O'Gara, R. W. 321,1224,2054
Ogino, T. 2614
O'Hegarty, M. T. 2062
Ohta, A. 2566
Ohtsuka, Y. 2794
Ohwada, Y. 1856
Okada, K. 1927
Okada, Y. 1445
Okano, T. 490,989,2038
Okigaki, T. 1479
Okruzhko, Iu. I. 897
Okuyan, M. 586
Old, L. J. 234,235,758,900, 901,1018,1019,1020,1815, 2626
Oleinick, A. 1107
Oleinick, S. R. 998
Oleinik, G. I. 2912
Olmos Tapia, A. 2237
Olson, C. 993,1588,2851
Olson, R. L. 1894
Onaka, M. 2614
Ondřej, M. 2261
O'Neill, C. 1569
O'Neill, C. H. 2434
Onesti, P. 1341
Ono, T. 857
Oort, J. 2516
Opler, S. R. 786,2069
Oppenheim, E. 2594
Oremus, D. 2791
Orfanos, C. 2473,2474
Orihata, H. 1635
Orlova, L. D. 1958
Orlova, L. V. 644,2163
Ornowski, S. 970
Orr, H. C. 579
Orr, J. W. 2284
Ortwerth, B. J. 2061
Osato, T. 356,827,1260,2096
Osato, Y. 2222
Osborne, R. H. 1981
Osogoshi, K. 1635
Osske, G. 1241,2265
Osswald, H. 718,2275
Østergaard, E. 2505
Ostertag, W. 1185
Osvaldo, L. 1434
Oth, D. 839
Otten, J. A. 365,2491
Otto, H. 2767
Oury, M. 395
Ouzounov, N. 2117
Overbeck, W. 2659
Owen, J. 1488
Oxford, J. S. 1915,2637, 2844,2845
Oxman, M. N. 2372
Ozaki, H. 1636
Ozer, H. L. 361,1280, 1909,2374

Paccaud, M. F. 2838
Pachman, D. J. 1218
Padeh, B. 1988
Padovec, J. 2680
Pagano, J. S. 832
Page, M. A. 266,1187
Paglia, M. A. 2745
Pai, S. R. 2801
Palao De Torres, J. 2693
Palao Villegas, M. 2693
Palekar, L. 964
Paley, W. B. 1344
Paloyan, D. 1179
Pamukcu, A. M. 1222
Pan, H. L. 700
Panazzolo, A. 2478
Pangborn, R. M. 967,968
Panteleakis, P. N. 836
Papa, G. 1803
Pappas, A. 2473,2474
Papworth, D. G. 1173
Paran, M. 2582
Paraskevas, F. 2314
Pardee, A. B. 2849
Pardo, M. 348,568,1007
Paredes, C. 2576
Paris, J. 561,2172
Park, H. Y. 297,2196,2323
Park, I. J. 667,1111
Park, W. D. 962
Parker, D. J. 1977
Parker, H. M. 2523
Parkhomenko, I. I. 2618
Parkman, R. 1890
Parks, V. R. 1212,1213
Parmentier, R. 1296
Parmiani, G. 2306
Parodi, A. 561
Parrilla, L. A. 2939
Parry, E. W. 2176
Parshad, R. 890,1168
Parsons, L. 661
Paskin, A. 1104
Pasternak, C. 2001
Pasternak, G. 1512,2864
Pastorová, J. 2134
Pataki, J. 496,2033
Patel, A. S. 532
Path, M. C. 2451
Patrick, R. S. 856
Patt, H. M. 1652
Pattillo, R. A. 426
Paul, D. 739,2281
Paul, J. 1159
Paul, J. S. 2030
Paul, P. 1358
Pauluzzi, S. 2366
Pavlovsky, A. 542
Pawelski, S. 233
Paymaster, J. C. 2129
Payne, L. N. 580,581,2109
Peacock, P. R. 494,2543,2544
Peale, A. R. 972
Pearson, G. 829,1348,1504,
  1505,2105
Pedersen, E. 229
Pedersen, S. N. 2170
Pedio, G. 315,2824
Pedrali, C. 2572
Peled, A. 2823
Pellett, O. L. 2717
Pennelli, N. 368,597,845
Pépin, J. M. 2221
Peraino, C. 2796
Peraudeau, L. 1033
Percival, W. H. 2798
Percy, C. 1094,1095
Pereira, G. 2941
Pereira, H. G. 1565,2917
Peries, J. 795,1034,1040,
  1825,2871
Perk, K. 577,578,1038,
  1039,2349
Perlin, L. 2675
Perman, V. 809
Pernis, B. 2541
Pernot, C. 1729
Pernot, M. 1729
Perry, S. 2452
Persaud, V. 886
Peters, E. 566
Peters, E. A. 1248
Peters, E. E. 856
Peters, J. A. 2160
Peters, M. V. 2662
Petersen, B. 1332
Peterson, H. I. 2812
Petkov, G. 1256
Petkovic, S. 1951
Petres, J. 289,290,2234
Petrini, M. T. 553
Petronic, V. 1951
Petropulos, S. F. 1446
Petrov, B. A. 1370
Petrova, I. P. 644
Petrovici, A. 1414
Petrun, A. S. 978
Pétursson, G. 1552
Pezzi, R. 1816
Pfeiffer, R. A. 2961
Pfitzer, E. A. 2011
Phaneuf, G. J. 1344
Phelan, J. T. 1090
Philips, F. S. 1773
Philipson, L. 2916
Phillips, B. 1486
Phillips, M. E. 2013
Phillips, P. A. 788
Phillips, S. J. 1334
Piaget, F. 1335
Pialoux, P. 1943
Piatkin, E. K. 1979
Piccotti, F. 471
Pickren, J. W. 1211
Picone, D. 614
Pienta, R. J. 1882
Pierce, E. R. 896
Pierce, G. E. 311,2611,2722
Pierotti, T. 1288
Pierre, O. 1814
Pigache, R. 1729
Pilch, Y. H. 1192,2295
Pileri, R. 1570
Pillsbury, N. 376
Piña, M. 1553,1838,2638,2856
Pinaudeau, Y. 1290
Pindborg, J. J. 397
Pineda, A. 1096
Pineles, S. 647
Pinkel, D. 548,599,851
Pinkerton, H. 2322
Pintado, T. 2842,2843,2897
Pintér, E. 2006
Pinus, A. G. 1958
Pípalová, J. 2583
Piper, W. N. 1420
Piperkov, T. 633
Pipkin, G. E. 1221,2326,2549
Pisano, E. 553
Pister, L. 783
Pistone, F. M. 2727
Piton, C. 2345
Pitot, H. C. 446,458,1155,
  2056,2057,2058
Pitts, J. D. 1916
Pitzurra, M. 1570
Placik, B. 1928
Plamenac, P. 2238
Planteydt, H. T. 1201
Platonova, G. M. 2547
Pliss, G. B. 2552
Plowman, K. M. 987
Poche, R. 854
Podliachouk, L. 2971
Poel, W. E. 263,1435,1892
Pogosiants, E. E. 2547
Pohjanpelto, P. 2903
Pohnke, B. 2577
Poirier, L. A. 2056,2057,
  2058
Poirier, M. C. 2058
Polani, P. E. 2776
Polasa, H. 1553
Poletti, A. 2819
Poliak, N. R. 949
Polijakoff-Mayber, A. 2792
Polishuk, W. Z. 861
Pollara, B. 1801
Pollard, E. C. 2202
Pollard, M. 1190,2412
Polli, E. 2503
Polliack, A. 299,726,
  1450,2285
Pollock, E. J. 255
Ponomarkov, V. I. 644,2163
Pontén, J. 433,549,1807,185
Pope, J. H. 1506,1798,2386
Popkirov, S. 1123
Popoff, N. 524
Popov, I. 2117
Popp, S. 2668
Poppe, E. 1629
Popper, H. 2805
Poppers, P. J. 2539
Poriadkova, N. A. 659,2714
Porta, G. D. 2306
Porteous, I. B. 2381,2899
Porter, D. D. 2435

Porter, I. H. 925
Portman, R. S. 987
Portolani, M. 1865
Porwit-Bóbr, Z. 1571
Possick, P. A. 2732
Pössnerová, V. 1347
Post, J. E. 562,793
Postlethwaite, R. 2381,2899
Pothier, L. 1590
Potter, C. W. 1915,2637, 2844,2845
Potter, M. 115,459,2297
Potter, V. R. 1195
Potvliege, P. 2303
Pound, A. W. 1736
Powell, D. J. 611
Poynter, R. W. 1793
Pozharisskii, K. M. 1411
Prada, C. 2941
Pradal, G. 1799
Prage, L. 2916
Prates, M. D. 623
Prato, V. 1073,1074
Prechtel, K. 2382
Prehn, R. T. 217,1492,1785
Prescott, B. 1004,2421
Presno-Albarrán, J. A. 2921
Pressman, D. 1244
Prestel, E. 420,1963
Pretorius, H. E. 986
Preussmann, R. 738,741,2059
Price, C. H. G. 2936
Price, J. M. 1222,1470,1471
Prieto Garcia, F. 2190
Prigozhina, E. L. 424
Priore, R. L. 974
Pristasova, S. 2863
Proenca, M. 2830
Proffitt, M. R. 2427
Proto, S. 2235
Provana, A. 1421,2270
Prunieras, M. 357
Prušová, F. 2134,2922
Przybyłkiewicz, Z. 1571
Ptáčková, B. 643
Ptak, W. 1571
Pugachiov, O. 735
Pugh, J. R. 264
Purcell, R. H. 2107
Purchase, H. G. 364,1262
Purchase, I. F. H. 986
Puri, R. K. 2950
Pustogarova, G. A. 2560
Pylev, L. N. 2040

Quenum, C. 2269,2790

Rabbat, A. G. 2095
Rabinowitz, Z. 996
Rabotti, G. F. 843,1830,2834
Rabson, A. 1247
Rabson, A. S. 360,413,1060, 2378,2383
Rabstein, L. S. 1607
Race, G. J. 2197
Radomski, J. L. 1774
Radzichovskaja, R. 1045
Rafferty, N. S. 2334
Ragland, W. 446
Rahman, Y. E. 2796
Raick, A. N. 2310
Rakušanová, T. 2357,2358
Rall, D. P. 1869
Ramos, L. 2431
Rangan, S. R. S. 760,1842
Rao, K. 1083
Rao, V. N. V. 530
Rapoza, N. P. 567,568,1007
Rapp, F. 685,1282,1283,1573, 1656,2092,2288,2366,2420 2429,2858
Rapp, H. J. 422,423,1792
Rask-Nielsen, R. 573
Rasponi, A. 2185
Ratcliffe, N. A. 2480
Ratner, I. A. 2878
Rauscher, F. J., Jr. 1055
Raven, R. W. 906
Ravid, Z. 2888
Rawls, W. E. 773,2906,2907
Ray, A. 440
Ray, F. 2027
Raychaudhuri, S. P. 990
Raynaud, J. 1854
Raynaud, M. 2345
Rechcigl, M., Jr. 1718
Recher, L. 2100
Reckzeh, G. 717,729
Reddick, R. A. 350,1006
Reddy, D. J. 642
Reddy, J. 521
Red'kin, Iu. R. 1399
Reed, W. B. 1369
Reem, G. H. 2344
Rees, E. D. 264,2320
Rees, R. J. W. 2094
Regamey, R. H. 2838
Reichert, J. K. 325,326
Reid, B. 468
Reid, L. 2019
Reisfeld, R. A. 1465
Reisher, J. I. 579
Reiskin, A. B. 269
Reisman, R. 2476
Renner, D. 2766
Rentsch, G. 1443
Ressel, F. A. 774
Restuccia, P. 1760
Reuber, M. D. 305,708,982, 1196,1235,1737,1775,2536, 2780
Reuvers, A. 703
Revzis, M. G. 2930
Reynolds, R. C. 2030
Řezáčová, D. 2840
Rhim, J. S. 353,1509, 2079,2409
Rhoades, J. W. 270
Rhodes, A. J. 916
Ribacchi, R. 492
Rich, M. A. 238,606,693,1252, 2073,2340,2341,2400
Richard, C. G. 562
Richards, V. 447,538
Richart, R. M. 1318,2508
Rickard, C. G. 243,793
Ridaura-Sanz, C. 649
Riebeck, P. A. 1253
Rieche, K. 2219
Rier, J. P., Jr. 1180
Rigdon, R. H. 2050,2205
Riggs, J. L. 354,1839,2837
Rijhsinghani, K. 274,2039
Rightsel, W. A. 1686
Riley, J. F. 1735
Riley, P. A. 942
Riley, V. 1649
Ríman, J. 1264,2082
Ringertz, N. 554
Riopelle, J. L. 2252
Ripstein, C. B. 482
Risdon, R. A. 875
Ritchie, A. C. 2310
Ritter, R. I. 1052,1544,1900
Ritzl, F. 2970
Rivera, J. 697,924
Rizki, R. M. 1189
Rizki, T. M. 1189
Robbins, F. C. 1688
Robbins, L. 1646
Robbins, P. W. 2426
Robel, P. 435
Roberts, B. A. 1417,2793
Robertson, D. D. 1810
Robertson, D. F. 1703,2764
Robertson, H. T. 2373,2426
Robertson, J. H. 1093
Robinson, D. W. 2765
Robinson, H. L. 1831
Robinson, J. B. D. 2927
Robinson, P. 2792
Robinson, W. S. 1831
Robl, M. G. 993
Roddick, J. W. 1311
Rodriguez, E. 866
Rodriguez Suarez, F. J. 2954
Rodriquez-Soriano, J. A. 2682
Roe, F. J. C. 295,445,2040, 2254,2289,2736,2798
Roed-Petersen, B. 397
Roger, A. 2980
Roger, V. 1956
Rogers, A. E. 1239,1745
Rohlfing, S. R. 1808,2408
Rolley, R. T. 423
Romano, E. 389
Romanov, K. P. 1534
Römer, F. 2657
Romero, J. J. 1806
Romero De Pacheco, L. 2941
Rommel, P. 2262
Rondia, D. 742,2273
Roque, A. L. 1211
Rosa-Brunet, M. 1857
Rose, E. F. 1219
Rosemann, G. 1965,2298,2299, 2300

Rosen, D. 525
Rosen, R. B. 1984
Rosenberger, G. 803
Rosenbergova, M. 801,2862,2863
Rosenblatt, M. B. 449
Rosenblum, E. N. 339,543,2107
Rosenkranz, H. S. 944
Rosenthal, A. S. 340,983
Rosi, F. 493
Rosillon, J. 930
Ross, A. E. 1762
Ross, C. F. 2018
Ross, E. 2406
Ross, E. M. 1256
Ross, J. M. 2195
Rossi, G. B. 1026,1598
Rosolini, D. 1930,1931
Rosso, R. 1633
Rost, H. E. 330
Roth, D. 1709
Rothblat, G. H. 1717
Röthig, W. 2542
Rott, R. 464
Rouse, H. 2857
Rousselet, G. 2588
Rousselot, L. M. 950
Roux, H. 2746
Rovin, S. 1216
Rowe, J. F. 1085
Rowe, W. P. 902,1886,2388,2628
Rowlands, J. R. 966
Rowley, J. Y. 755
Rowson, K. E. K. 445,1813
Roy, A. K. 1419
Roy, J. 1299
Roy, R. 2483
Roylance, P. J. 1320
Royston, I. 403
Różewicki, S. 2577
Rozman, C. 2579
Ruben, L. N. 908,2334
Rubenchik, B. L. 978
Rubin, B. A. 2918
Rubin, H. 379
Rubin, R. 1872,2416
Rudolph, R. 1867
Ruiter, M. 2965
Rullière, R. 249,2931
Rush, B. F. 1216
Russell, L. B. 1025
Russell, L. T. 1485
Russell, W. C. 2917
Russell, W. J. 1870
Russfield, A. G. 2575
Rustrian Azamar, A. 2237
Rutovitz, D. 673
Rüttner, J. R. 315,2246,2824
Rwomushana, J. 726
Rybina, N. I. 887
Ryckewaert, A. 2141
Rylander, R. 969,2788

Saavedra Virhuez, P. 2693
Sabin, A. B. 456,2904
Saccomanno, G. 2524
Sachs, L. 996,2582,2619
Saegesser, F. 1154
Saenger, E. L. 477
Saez-Serrania, J. 2579
Saffiotti, U. 1136,1220,1777
Sage, H. H. 1709
Sagerman, R. H. 2009
Ságner, Z. 2583
Sahnazarov, N. 2642
Sah Sook Cho, 1844
Saito, H. 2346
Saito, Y. 1835
Sakakibara, T. 1460
Sakakura, T. 2612
Sakamoto, K. 1635
Saksela, E. 433
Salaman, M. H. 779,1515
Salazkin, M. A. 334
Saldeen, T. 1315
Salimi, R. 1111
Sall, S. 1096
Salmela, H. 1630
Salser, J. S. 2184
Salvi, M. R. 831
Salzer, G. M. 396,2002
Samachson, J. 924
Samaille, J. 1001
Sambrook, J. 830
Samoilovich, L. N. 1399
Samuel, I. 2632
Sanchez, M. 348
Sanchez Muros, J. 1175
Sanchorawala, C. J. 497
Sandbank, M. 1326
Sandberg, A. A. 1113,1650,1996
Sandelin, K. 2877
Sander, J. 2569
Sanders, F. K. 712
Sandison, A. T. 1070,1960,2162
Sandorfy, C. 1245
Sandritter, W. 317
Sanford, K. 2702
Sanford, K. K. 890,1168,1683
Sano, S. 1824
Sano, T. 715
Santoro, L. 2478
Sanvito, W. L. 2707
Saporoschetz, I. B. 1716
Sapp, W. J. 541
Saprin, A. N. 2477
Saracino, R. T. 2971
Sardet, C. 1717
Sarkar, N. H. 1901
Sarma, P. S. 2355,2410,2608
Sasaki, M. 2189
Sasaki, M. S. 926
Sasaki, T. 2045
Saslaw, L. D. 2054
Sasso, G. F. 2472
Sato, C. 1167
Sato, C. S. 1647
Sato, H. 273,303,1635
Sato, J. 2187
Sato, K. 303,474,1176,1406
Sato, M. 1539
Sato, T. 1163
Satterfield, L. C. 1498
Sauer, G. 1862,2375
Saunders, E. F. 2754
Savage, E. L. 562
Saviano, M. S. 2204
Savino, A. 2738,2785,2786
Sawicki, E. 938
Sayed, W. A. 2171
Sayenko, A. J. 2120
Scapoli, G. L. 655
Scarpa, F. 2478
Scassellati Sforzolini, G. 2785,2786
Scazziga, B. R. 1152
Scevola, M. E. 570
Schabel, F. M., Jr. 2389
Schacht, U. 275
Schade, R. O. K. 961
Schäfer, C. H. 1313
Schafer, L. J. 1463
Schäfer, W. 783,800
Schaffner, F. 2805
Schardein, J. L. 1961
Schauer, A. 1739
Schell, K. 353,837,1562
Schenk, D. 324
Schenker, J. G. 861
Scher, S. 1028
Scher, W. 1598
Scherrer, R. 1585
Scherzer, M. 1414
Scheurlen, P. G. 2473,2474
Schicha, H. 2970
Schidlovsky, G. 1532,1913, 2077,2110,2393
Schiefer, B. 869
Schievelbein, H. 914
Schiffer, L. M. 1100
Schilling, G. 1429,2324
Schilling, H. 858
Schjønsby, H. 868
Schlegel, J. U. 1221,2326,2549
Schlesinger, M. 2712
Schlesinger, R. W. 1353,2857, 2894
Schmähl, D. 308,442,451,718, 1726,2206,2275
Schmalhorst, W. R. 2689
Schmauss, A. K. 2675
Schmid, F. A. 1776
Schmidt, F. W. 817
Schmidt, R. M. 944
Schmittle, S. C. 820,821,822
Schneid, V. 1314
Schneider, R. 1292
Schnurrbusch, U. 2262
Schöder, H. J. 410
Schoental, R. 314,1148,2052 2498,2807
Schöffling, K. 432
Scholtz, W. 411
Scholtze, P. 1242,1530
Scholz, W. 1298
Schonland, M. 1065
Schramm, T. 1011,2001,2758, 2879

Schreiber, D. 1242,1243,1530 1728,2264,2265
Schricker, K. T. 2135,2330
Schroeder, H. A. 2291
Schuler, D. 2981
Schüller, W. 2004
Schulman, J. F. 1883
Schultz, R. D. 1272
Schulz, H. 2004
Schulz, K. 1125
Schulze, A. 1701
Schuman, L. M. 864
Schurr, P. E. 1181
Schutte, H. 1646
Schütte, K. H. 504
Schwabe, K. 2479
Schwanitz, G. 2331
Schwartz, G. F. 1309
Schwarz, K. 448
Schwartz, S. O. 1808, 2408
Schweid, A. I. 1957
Schweiger, H.-G. 464
Schweinsberg, F. 2569
Schweisguth, O. 1324
Scott, D. 572,1884
Scott, R., Jr. 2689
Scott, W. 1798
Scutchfield, F. D. 2779
Seal, P. 942
Sedlis, A. 1096
Seemayer, N. 834,2891
Sega, E. 630
Segaloff, A. 276
Segawa, A. 2489
Sehrbundt, H.-J. 1964
Sei, M. 1635
Seidel, H. J. 981,1918
Seidman, H. 1094,1095
Seido, T. 1027,2343
Seifert, G. 2500
Sekiyama, S. 1756
Sekula, J. 971
Sela, M. 464
Seland, P. 1088
Selenka, F. 323,940
Selikoff, I. J. 963
Selin, C. E. 498
Sellakumar, A. R. 1777
Sellers, A. H. 621,1300
Sellyei, M. 660
Seman, C. 1059
Seman, G. 1059,1802,1805,1895, 2335,2830
Senda, H. 2489
Sendo, F. 1365,2346
Sendov, B. 2695
Sengupta, P. 2565
Senik, A. 1822
Serr, D. M. 1988
Sessa, G. 1457
Seto, T. 1230
Severi, L. 294
Sevoian, M. 798
Sezaki, T. 307
Shabad, L.-M. 470
Shabalkin, V. A. 2477
Shachat, D. A. 578
Shah, K. V. 569,1279,2090
Shaki, R. 1988
Shamberger, R. J. 1778,2573
Shani, M. 1108,2139,2955
Shannon, I. L. 967
Shapiro, B. Ia. 1082
Shapiro, S. 640,2153
Sharma, A. K. 736
Sharma, S. C. 501
Sharp, C. R. 2439
Sharp, J. L. 1754
Shatton, J. B. 2711
Shaw, G. J. 349
Shear, M. J. 2497
Shedd, D. P. 1081
Sheers, G. 507
Sheh, I. F. 1796
Sheinin, R. 1850
Shekhter, A. I. 2930
Sheldon, W. F. 1163
Shellabarger, C. J. 1779
Sherlock, P. 526
Shershulskaia, L. V. 369
Shevliagin, V. Ia. 1655
Sheviliagin, V. Y. 381
Shevliagyn, V. 2875
Shibley, G. 1875
Shibley, G. P. 782,1031,2077
Shiffer, I. V. 2699
Shigeno, N. 235,900
Shigeta, S. 341,1914
Shih, L. Y. 1659
Shimamoto, K. 2449
Shimizu, K. 927,1697
Shimkin, M. B. 917,1198,2045, 2302,2570,2571
Shimojo, H. 1549,1858, 2839
Shimono, H. 2649
Shin, H. I. 921
Shinoda, M. 2449
Shintani, K. 1459
Shioura, N. 2932
Shirahama, S. 2085
Shirai, T. 2346
Shirai, Y. 1635
Shiraishi, T. 2488
Shiratori, O. 356,2096
Shires, T. K. 2257
Shirley, B. C. 1761,2328
Shiroki, K. 2839
Silberman, S. 2973
Simu, G. 2804
Sinkovics, J. G. 2880
Shisa, H. 2037,2612
Shiu, G. 2410
Shklar, G. 2556
Shope, R. E., Jr. 809
Shubik, P. 274
Shuck, A. E. 264
Shullenberger, C. C. 602,848, 2603
Shultz, G. N. 2326
Shumrick, D. A. 1939
Shustov, V. Ia. 1397
Shvemberger, I. N. 284
Sibal, L. R. 1278,1810,1899, 2361,2593
Sidwell, R. W. 2389
Siebert, G. 1238
Siegal, A. M. 1172
Siegel, B. V. 784,2600
Siegel, J. H. 1646
Siegel, W. V. 2556
Siegler, E. E. 2444
Siegler, R. 239,606,693,1887, 2073,2340,2407
Sievers, S. 2242
Sigel, M. M. 1050, 1870
Sigidin, Ia. A. 1336
Sigmon, E. 2312
Silberman, M. S. 821
Silverstein, M. N. 892
Silviano Brandão, H. J. 2457, 2715
Simard, A. 261,1234
Simić, B. 2528
Simionescu, N. 1414
Simkovic, D. 1446
Simmers, M. H. 645
Simpson, C. F. 1265
Simpson, W. L. 1780
Sims, H. 1038
Sims, P. 749,1430
Simson, L. R. 669
Singer, S. H. 2086
Singh, C. M. 870
Singh, S. 1245
Sinkovics, J. G. 571,602,848, 1510,1876,2100,2603
Sinnhuber, R. O. 517,1226, 1227,2585
Sinskey, T. J. 345
Sircus, W. 1973,2195
Sirtori, C. 2493,2501
Sissons, H. A. 2127
Sivak, A. 1200,1781,2027,2286
Sixtus-Klug, B. 420
Sjögren, H. O. 2088
Škeřík, P. 384
Skidmore, J. W. 1462
Škoda, V. 2155,2940
Skorochodzki, L. 1285
Skyring, A. 1934
Slattery, S. 1913
Slavin, G. 2691
Sleamaker, K. 2475
Slemmer, G. L. 1782
Slifkin, M. 348,567,568,1007
Sloane, J. A. 1329
Slowatizky, I. 2792
Slowinski, E. J. 910
Smakhtina, O. L. 1622
Small, C. 1780
Small, C. S. 859
Smida, J. 1540,1541
Smidová, V. 1540,1541
Smigla, K. 2968
Smillie, A. C. 1749

Smith, B. C. 641
Smith, C. J. 2810
Smith, D. B. 2679
Smith, D. W. 764
Smith, E. M. 2154,2522
Smith, F. 1800
Smith, G. 2028
Smith, G. H. 2388
Smith, H. 436,437,438
Smith, H. C. 1195
Smith, J. 1547
Smith, J. W. 548,1906
Smith, K. L. 2349
Smith, K. O. 1248,1690,2385
Smith, O. 566
Smith, P. G. 962
Smith, R. D. 2309
Smith, W. E. 1783
Snell, G. D. 574
Snell, K. C. 1291,1416
Snider, B. J. 701
Snider, G. L. 1928
Snyder, F. 421
Snyder, S. P. 2071
Soehner, R. L. 1888
Sofuni, T. 1113
Sohier, R. 1249
Sokal, J. E. 1650
Sokol, F. 2375,2422,2885
Sokoloff, L. 1416
Sokolovsky, R. M. 1150
Soloimskaia, E. A. 319
Solomon, H. A. 974
Solomon, J. J. 581,1262
Somers, K. D. 605,847,1821
Sommers, S. C. 1344
Somoda, T. 1634
Song, C. W. 2014
Song, I. C. 415
Sonley, M. J. 2662
Sorensen, D. K. 809
Sorheim, A. O. 2161
Sorof, S. 1237,1238
Sottong, P. 1259
Souadjian, J. V. 892
Soule, E. H. 1944
Southam, C. M. 1446
Sovová, V. 2356
Spaar, U. 317
Spaeren, U. 1738
Spahn, G. J. 1881
Spain, D. M. 482
Spanedda, R. 655
Spano, G. 2167
Spatz, M. 724,1146,1784
Spears, G. F. S. 1632
Spencer, H. 924
Spencer, H. H. 1708
Sperber, A. 662,2458
Spiers, A. S. D. 2962
Spiers, P. S. 2772
Spigliati, P. 2655
Spjut, H. J. 765
Spratt, J. S., Jr. 2957
Springer, K. 2253
Srinivasan, P. R. 830
Srivastava, S. P. 501
Stackpole, C. W. 1866
Stadler, L. 717
Stamatović, S. M. 811
Stanfield, L. L. 2693
Stanley, N. F. 788
Stanton, D. 1892
Stanton, M. 2021
Staples, P. J. 1342
Stark, C. R. 2142
Štark, O. 1346
Staszewski, J. 860
Staubesand, J. 1443
Stavrovskaia, A. A. 424
Steck, T. L. 1048
Stedman, R. L. 1458,2022, 2023
Steel, G. G. 1367
Steele, W. J. 2315
Steeves, R. A. 1025,1254, 1879,2342
Steggles, A. W. 431
Steinhoff, D. 2251
Steinitz, R. 861
Steinmuller, D. 1785
Stelmachowska, A. 904
Stemmermann, G. N. 2687
Stenback, W. A. 1525,1710
Stenger, R. J. 2276
Stephens, C. A. 2662
Stephens, R. 1031
Steplewski, Z. 833
Sterglanz, H. 704
Stern, E. 1434
Sternberg, S. S. 1773,1793
Stetson, C. A. 903
Stevens, G. M. 2445
Stevens, J. 2334
Stevens, M. 727
Stevenson, J. G. 747
Stevenson, M. I. 551
Stevenson, R. E. 1921
Stewart, H. L. 413,1291,1416
Stewart, S. E. 551,592,593,776
Stich, H. F. 1903
Stickley, E. E. 472
Stiffel, C. 601,853
Stiop, L. D. 256
Stirpe, F. 1865
Stöber, M. 802
Stock, C. C. 2068
Stockert, E. 235,900
Stockert, J. C. 2191
Stoian, M. 2631
Stoitchkov, Y. 2870
Stoker, M. 1569
Stoker, M. G. P. 2210
Stoker, T. A. M. 2051
Stokinger, H. E. 2734
Stolfi, R. L. 1870
Stone, D. B. 617
Stone, M. L. 1096
Stone, O. J. 1351
Stone, R. S. 2157
Stophanskaya, A. G. 2912
Stoytchkov, Y. 1519
Strachan, I. M. 1977
Strandstrom, H. V. 2384
Straub, O. C. 806,807
Strax, P. 2153
Streifler, M. 1758
Streissle, G. 1923
Streliukhina, N. V. 336,424
Strohl, W. A. 2857
Stroller, F. M. 1941
Strong, L. C. 2365
Stroobandt, G. 280
Struve, M. E. 500
Stuart, A. 1590
Stuart, R. S. 1099
Stubbs, E. L. 582
Stukonis, M. 2440
Stumphius, J. 1202
Stüper, P. 1097
Sturelid, S. 2532
Stutman, O. 1186,1547,1786, 2042
Stutzman, E. 282
Subhiyah, B. W. 1295
Subko, E. 2325
Subrt, I. 2680
Suga, Y. 2828
Sugahara, T. 2783
Sugano, H. 722,1823
Sugár, J. 1444
Sugarman, G. 1369
Sugawara, K. 2222
Sugimori, H. 1316
Sugimura, T. 304,1428,1714
Sugiyama, S. 1230
Sugiyama, T. 710,1759,1787, 2043
Suhr, N. H. 2483
Sulis, E. 2167
Sunagawa, N. 1404
Sundelin, P. 479
Sunderman, F. W., Jr. 498, 1231,1669
Supeno, S. 1068
Sushchenko, I. B. 1958
Suskind, R. R. 2555
Suss, R. 1713,2065
Suter, R. B. 734
Sutherland, J. C. 401
Sutnick, A. I. 1671,2490
Sutton, C. H. 524
Sutton, P. R. N. 672
Suzuki, H. 2044,2568
Suzuki, Y. 1835
Svec, F. 1043
Svec, J. 1043
Svedmyr, A. 2852
Svenkerud, R. 230
Svet-Moldavsky, G. J. 2859, 2898
Svoboda, D. 520,521
Svoboda, J. 1535,2872,2908
Swain, A. P. 2022,2023
Swain, L. W. 1180
Swann, P. F. 1400,1410,2049
Swaye, P. 1641
Swearingen, G. R. 1806

Sweeny, P. R. 1536
Swerdlow, M. 952
Swetly, P. 1908
Swinney, J. 961
Sydnor, K. L. 2029
Sykes, J. A. 1277,2100
Syruček, L. 464
Sytnik, A. P. 1370
Szabó, D. 2777
Szafarz, D. 2063
Szakacs, A. 571
Szanto, P. B. 2665
Szepsenwol, J. 1788
Szwagrzyk, E. 1948
Szybalski, W. 1402
Szydłowska, H. 1067,1948

Tabachnick, J. 2014
Tabarés, E. 2842,2843,2897
Tachibana, M. 2530
Tacke, R. B. 1023
Tagashira, Y. 491,705
Tagaya, I. 2919
Taguchi, F. 1851
Tai, H. T. 2644
Takada, M. 1856
Takadate, A. 2038
Takagi, N. 1113
Takahashi, I. 857,1756
Takahashi, K. 2953
Takahashi, M. 2614
Takahashi, T. 1780
Takahashi, Y. 2165
Takakura, K. 1352
Takano, A. 2137
Takano, K. 1635
Takashi, T. 1363
Takasugi, N. 1361
Takata, H. 306
Takayama, S. 722,980,
 1425,1730
Takeda, K. 951
Takeda, M. 2624
Takehara, M. 2623
Takei, K. 1078
Takemori, N. 1839,2837
Takemoto, K. K. 360,361,
 1280,1907,2374
Takenaka, I. 766
Takeoka, O. 2449
Takeuchi, J. 292
Takeuchi, T. 1636
Takeya, K. 2294
Taki, I. 1753
Takizawa, S. 1695
Talal, N. 1342
Tálas, M. 1572,1855
Talash, M. 1576
Talerman, A. 886
Talukdar, G. 736
Tamagaki, H. 1163
Tambourin, P. 1814,2629
Tamura, M. 2566
Tanabe, T. 1635
Tanaka, K. 689,1693
Tanaka, S. 1446
Tandy, R. K. 416
Tanimura, H. 509
Tank, R. 253
Tarba, M. M. 1587
Tarin, D. 1734
Tassi, G. C. 570
Tatsuno, T. 1184
Taube, A. 2920
Tauchnitz, C. 2749
Taupp, W. 2770
Tausch, H. 1242
Tawara, K. 1835
Taylor, D. O. N. 1122,1293,
 2348
Taylor, H. B. 2447
Tayot, J. 1134,1205
Teather, C. 1574
Tefft, M. 484
Tegner, Y. 2533
Teixeira, J. 2669
Teller, M. N. 2068,2184
Telles, N. C. 1705
Temin, H. M. 585,1042,
 1833,2211
Templeton, A. R. 507
Tennant, J. R. 574,2336
Tennekoon, G. E. 2124
Teplitz, R. L. 2717
Ter-Grigorov, V. S. 1827,
 2620,2621
Terao, K. 984,2803
Terashi, S. 759
Terayama, H. 306
Terracini, B. 1130
Tessmer, C. F. 571,656,1882
Tevethia, S. S. 1282,1283,
 1573,2092,2429
Thatcher, D. 2045,2570
Theilen, G. H. 1271,2071
Theuring, F. 2217
Thibaut, G. 483
Thiel, J. F. 2385
Thiess, A. M. 1455
Thoma, G. E. 477
Thomas, C. 737,741,2266,2816
Thomas, C. G., Jr. 1488
Thomas, D. 2856
Thomas, F. B. 1882
Thomas, J. A. 859
Thomas, M. 1034,1519,2870
Thomas, R. G. 1395
Thomas, R. L. 1395
Thomas, W. O., Jr. 2760
Thomine, J. M. 2978
Thompson, J. R. 2005
Thomsen, J. J. 2097
Thomson, S. 1024,1880,2075,
 2342,2598
Thorarinsson, A. 2942
Thorne, H. V. 994,1853
Thorslund, T. W. 474,1176
Thuilleux, G. 2935
Thurston, O. G. 428
Thurston, P. 253
Thurzo, V. 1540
Ti Ho 1844
Tiboldi, T. 511
Tiggelbeck, D. 1502
Tikhonova, Z. 2875
Tiltman, A. J. 1952
Timbrell, V. 1462
Timmermans, A. 838
Ting, R. C. 375,1520,1522,
 1890
Ting, R. C. Y. 361,1280
Tison, M. J. 2279,2806
Titus, J. L. 892
Tkachev, P. G. 714
Tockstein, G. 1553
Todaro, G. J. 255,1578,1579,
 1581,1840,1907,1922,2213,
 2831
Toews, H. A. 1109,1112
Tokuhata, G. K. 1953
Tokuzen, R. 425,1811,1812,
 2070
Tolker, E. B. 2011
Toman, R. 2134,2922
Tomatis, L. 271,2250,2263
Tominaga, T. 1789
Tomingas, R. 327,328
Tomkin, G. H. 2194
Tomkins, G. A. 1114
Tompkins, E. A. 477
Tompkins, W. A. F. 773,2906,
 2907
Töndury, G. 2511
Toolan, H. W. 1846
Toplin, I. 1259
Torres, F. O. 623
Tortora, M. 1321
Toshiki, T. 951
Toshima, S. 1058
Tosi, P. 298,1413
Toth, B. 2046,2047
Tóth, J. 1444
Tough, I. M. 1648
Tournier, P. 1863,2392
Toury, J. 2269,2790
Toutain, D. 2249
Tow, S. H. 1110
Toya, R. E., Sr. 531,976
Toyota, B. 1938
Tracey, J. P. 526
Trainin, N. 2518
Trainin, Z. 1270
Traissac, R. 515
Trávníček, M. 1533,2605
Traynor, J. E. 1172
Trebbin, H. 429
Trefný, J. 390
Treger, A. 2321
Tregier, A. 1451
Trentin, J. J. 564,1525,
 1710,2417,2418
Tretter, P. 2009
Tridente, G. 597,845
Tridents, G. 368
Trifaud, A. 2746
Triolo, V. A. 917
Tripathi, V. N. P. 2938

Troll, W. 1457,1482
Trousdale, M. D. 2385
Truhaut, R. 2249
Tsanev, R. 2695
Tseng, P. 1111
Tsetlin, E. M. 1563,1845
Tsigelnik, A. Ia. 1082
Ts'o, P. O. P. 2032
Tsubota, T. 1035
Tsubura, E. 1454
Tsubura, Y. 2829
Tsuchiga, K. 1932
Tsuchiya, Y. 2919
Tsuji, K. 989
Tsuruta, R. 2037
Tsysina, E. I. 2621
Tubio, J. 2683,2684
Tung, C. M. 1796
Tung, T. C. 1796
Turano, A. 1041,2352,2595
Turiaf, J. 1204
Turnbull, A. D. M. 1079
Turner, H. C. 353,1000,1509, 1831,2409,2608
Turner, J. H. 663
Turner, W. 572,577,1884
Turusov, V. S. 512
Tusques, J. 1799
Tweeddale, D. N. 1311
Tyndall, R. L. 365,2491
Tyrrell, S. 1247

Uchida, Y. 1407
Udovich, M. 616,1621
Ueberschär, S. 1273
Ueda, T. 951
Uekama, K. 490,2038
Uematsu, K. 954
Uhl, C. 1455
Umans, R. S. 2032
Undeutsch, W. 2729
Unuma, T. 743
Upton, A. C. 241,365,1498
Urbach, F. 1711
Urbaneck, D. 1268
Urbańska-Bonenberg, L. 2968
Ure, D. M. J. 2461
U.S. AEC Lovelace Found. 1371,1372,1373,1374,1375, 1376,1377,1378,1379,1380, 1381,1382,1383,1384,1385, 1386,1387,1388,1389,1390, 1391,1392,1393,1394
Uslenghi, E. 1073,1074
Usui, K. 2187
Utsumi, K. R. 356
Utz, D. C. 430
Uy, E. S. 2973
Uzman, B. G. 1912

Vaage, J. 1546
Vadlamudi, S. 2074
Vadura, F. 2114
Valaitis, J. 2546
Valdivia Ampuero, A. 619
Valdmanis, A. 1348
Valentine, A. F. 796
Valentine, R. C. 2917
Valér, M. 2329
Valette, R. 2790
Valladares, Y. 2841,2842, 2843,2897
Valmikinathan, K. 530
Van Bruggen, E. F. J. 2836
Vandeputte, M. 1001
Van Der Eb, A. J. 2836
Van der Gugten, A. 838
Van Der Maaten, M. J. 1274
Van Der Noordaa, J. 1583, 2896
Van Duuren, B. L. 1131,1138, 1200,1457,1781,2027,2286
Van Hoosier, G. L., Jr. 564,1525, 1710,2417,2418
Van Kesteren, L. W. 2836
Van Nostrand, D. 1083
Van Ordstrand, H. S. 1641
Van Rooyen, C. E. 916
Van Zwijndregt, H. A. 2236
Vardi, J. 1758
Varet, B. 1129,1822
Varone, G. L. 1804
Vasil'eva, I. A. 514
Vasil'eva, N. N. 1563
Vasil'eva, V. A. 1508
Vawter, G. F. 484
Vdeyaratnam, G. 2159
Veale, A. M. O. 2143
Veazey, R. A. 1485,2271
Veenema, R. J. 2697
Velicer, L. F. 2419
Venet, L. 2153
Venkatesan, N. 1423
Vennström, R. 816
Venuat, A.-M. 2335
Vepřek, L. 1264
Verbo, S. 1719
Veres, J. 716
Veret, J. 1205
Verghese, N. 530
Verma, V. S. 990
Vernick, S. H. 1038
Verschuuren, H. G. 2799
Veselý, P. 2356
Vesselinovitch, S. D. 259,260,537,1193,1790,2066
Vettori, G. 1126
Veys, C. A. 2937
Viala, C. 1834
Vianello, M. G. 654
Vice, T. E. 2878
Vidal, P. M. 1773
Vigier, P. 687,2355,2390
Vigliani, E. C. 2541,2771
Vilar Dominguez, E. 2684
Villalobos Perez, J. J. 610
Villa-Treviño, S. 522
Vinter, V. G. 513
Viola, M. 2868
Viola, M. V. 2349
Violante, A. 2819
Virag, I. 1108,1286
Virolainen, M. 1057
Viscomi, N. 629
Vishnoi, R. 634
Vittoz, R. 810
Vivancos-Gallego, G. 2126
Vogel, H. H., Jr. 2761
Vogt, P. K. 464,1689,1820
Vohra, V. G. 2129
Voiculet, N. 1691
Voitsekhovskaia, S. G. 1712, 1972
Volfson, N. I. 1150
Volkova, M. A. 1979
Volm, M. 1713,2065
Von Der Oelsnitz, G. 2661
Von Essen, C. F. 1081
Von Hodenberg, A. 2059
Vonka, V. 2435,2641,2840
Von Kreybig, T. 2781
Von Rahden, U. 706
Von Sallmann, L. 2383
Vorob'ev, A. I. 1979
Vuori, E. E. J. 2441
Vysheslavova, M. Ia. 947

Wada, S. 1360
Wada, T. 1955
Waelbroeck-Van Gaver, C. 2303,2304
Wagenknecht, L. V. 2733
Wagner, G. 443
Wagner, J. 2312
Wagoner, J. K. 2154
Wahal, K. M. 487
Wahi, P. N. 973,2156
Wähmer, M. 2262
Wahren, B. 1029,1030,2865
Waldorf, D. S. 2008
Waldrop, F. S. 1769
Wales, J. H. 517,1226,1227
Walike, J. W. 2466
Wallach, D. F. H. 909
Wallbank, A. M. 582
Wallis, L. A. 2200
Walsh, J. H. 2107
Walters, C. L. 960
Waltz, T. A. 2366
Wanebo, C. K. 474,1176
Wang, J. J. 1796
Waravdekar, V. S. 2054,2074
Ward, B. C. 1705
Ward, J. M. 1271
Warden, D. 994,1853
Waridel, D. 1154
Warnock, M. L. 2476
Warren, K. S. 2276
Warren, S. 932,933,1654
Warwick, G. P. 2040
Warzok, R. 1241,1243,1728, 2264
Wassef, S. A. 2171
Watanabe, F. 2179
Watanabe, H. 1971

atanabe, I. 1363
atanabe, K. 759,1438,1837
atanabe, M. 1538,1539
aterhouse, J. A. H. 611
atkins, J. F. 2908
atne, A. L. 2967
atson, J. 2011
attenberg, L. W. 266,1187, 1453
attré, P. 1001
augh, T. 2762
axman, V. 1569
eaver, N. K. 2540
ebb, M. 2290
eber, A. F. 1269
eber, K. 385
ecker, E. 464
edderburn, N. 1515
eeks, J. R. 2378
eil, C. S. 2534
eiler, O. 812,2354
einhold, E. 806,807
einhouse, S. 2711
einstein, D. 2646
einstein, I. B. 750,1481
eir, J. M. 2672
eisburger, E. K. 267,680, 702,744,745,2801
eisburger, J. H. 267,680, 702,744,745,939,1744,1748, 1765,2063,2801
eisfeld, H. P. 327
eiss, D. W. 840,2362
eiss, E. 1867
eiss, M. C. 2648
eissmann, G. 1457
eiszfeiler, G. 1572
elch, R. M. 2539
ellings, S. R. 402
ellington, J. S. 454
ells, D. 2182
elsch, C. W. 283,1902
elte, W. 2934
endling, F. 1814,2629
engraf, A. 2805
enner, H. A. 1507
enyon, C. E. M. 2250
erchau, H. 2890
erder, A. A. 792,1893,2405
erner, G. H. 583,2881
essel, W. 2816
etteland, P. 921
etters, E. J. 2386
etzel, R. 2758
hang-Peng, J. 2174
heatley, D. N. 2778
heeler, E. J. 1791
heeler, G. P. 371
heelock, E. F. 1878,2399
hitcutt, J. M. 1564
hite, J. G. 1801
hitelaw, D. M. 889
hitescarver, J. 1277,2100
ieder, R. 1198,2045
iernick, P. H. 2174
ieser, O. 874
Wijesundera, S. 2587
Wildner, G. P. 316,2132, 2260,2663
Wilk, M. 2770
Wilkinson, J. L. 2442
Wilkoff, L. J. 371
Willard, S. 2090
Williams, A. E. 436,437, 438,2480
Williams, A. O. 1942
Williams, E. H. 495,2677
Williams, L. B., Jr. 1509
Williams, R. E. 2451
Williams, R. E. O. 2809
Williams, S. N. 2586
Williams, W. C. 377
Willis, J. 2943
Wilner, B. I. 1680
Wilson, H. 1302
Winchell, H. S. 2230
Windhorst, D. B. 1801
Windsor, M. W. 335
Winkelstein, W., Jr. 2674
Winocour, E. 1355
Winter, C. 707
Winter, D. 2631,2632
Wirth, G. 2232
Wiseman, R., Jr. 2064
Wittbrodt, S. 2260
Wittekind, D. 1443
Winqvist, G. 1284
Wiśniowska, J. 1153
Witter, R. L. 819,1677
Wittmann, W. 805,1268
Witwicki, T. 1177
Witzleben, C. L. 668
Wivel, N. A. 1013,1873, 2349,2593
Wlos, R. 496
Wodinsky, I. 1869
Woessner, S. 2579
Wogan, G. N. 988,1143,1145
Wojcieszek, Z. 1628
Wold, J. W. 2315
Wolf, A. 2592
Wolf, G. 1999
Wolf, H. 2733
Wolf, P. F. 622
Wolfe, J. N. 2223
Wolfe, L. G. 1063,1064
Wolff, E. 2459
Wollmann, R. L. 1516
Wolpaw, S. E. 1641
Wolska, A. 1637
Wong, A. 1536
Wood, J. W. 1163
Wood, M. 2255
Wood, R. 421
Woodard, J. R. 1304
Woodliff, H. J. 1341
Woodruff, J. D. 1110,1111, 2168
Woodruff, J. M. 1643
Woods, D. A. 2810
Woods, J. 2943
Woods, W. A. 1883
Woyke, S. 1075
Wright, B. S. 782,1031,2077
Wright, H. B. 1086
Wright, R. L. 1974
Wright, S. R. 1395
Wu, H. 2426
Wunder, R. 2113
Wyers, M. 561
Wynder, E. L. 675,1076, 1132,1456,2137

Yagi, Y. 1244
Yamada, H. 1352
Yamada, N. 1636
Yamada, S. 2568
Yamafuji, K. 1407
Yamagata, N. 923
Yamaguchi, J. 550,2104
Yamamoto, K. 2222
Yamamoto, R. S. 744,745, 1744,2801
Yamamoto, S. 1699
Yamamura, Y. 1454
Yamane, Y. 965,1856
Yamanouchi, K. 2633
Yamasawa, S. 1191,2555
Yamashita, S. 2449
Yamashita, T. 1549
Yamawaki, S. 951
Yanai, R. 767,1436
Yancey, S. T. 321
Yang, J. 374
Yasuhira, K. 301,302,912, 1415,2282
Yates, V. J. 1566,2367
Yazdi, E. 1783
Yeager, D. 1463
Yerganian, G. 1844,2492
Yielding, K. L. 704
Yilmazer, S. 1272
Yip, L. C. 2517
Yohn, D. S. 545,775,1903, 1904,2104
Yokoro, K. 1695,1704,2229
Yokoshima, T. 1714
Yokoyama, Y. 2165
Yoshida, K. 599,851
Yoshida, O. 1927
Yoshida, T. O. 587,1759
Yoshikawa-Fukada, M. 2835
Yoshikura, H. 1513,1823
Yosida, T. H. 1115,2037
Youn, J. K. 849,1037,1818
Young, J. L. 413
Young, J. M. 941
Young, J. T. 1051
Young, S. 312
Young, V. R. 1239
Yu, P. L. 2517
Yunis, E. J. 1186,1547,2042
Yuyama, S. 2835

Zaccari, J. J. 2080
Zacharia, T. P. 1190
Zachariasewycz, E. 1014
Zaitseva, M. V. 1958
Zajac, B. A. 1503,2101
Zajdela, F. 370,728,1814,2629
Zakhariev, T. 867
Zakharov, A. F. 424
Zaldívar, R. 171,1969
Zamarriego, J. 2683,2684
Zambernard, J. 590,2111
Zamfir, Gh. 2731
Zanetti, M. 2606
Zangeneh, F. 1328
Zasypka, A. T. 977,2535
Zatsepin, N. I. 2912
Zavadil, M. 1314
Závadová, H. 2641,2840
Zbar, B. 1792
Zedeck, M. S. 1793
Zee, T. 840
Zeilmaker, G. H. 382
Zelickson, A. S. 546,1801
Zeman, K. 384
Žemla, J. 1567,2889
Zetterberg, G. 2531
Zhivetskii, A. V. 638
Zichel, R. 1313
Ziegler, J. L. 2753
Ziehe, K. R. 410
Zilber, L. A. 1364
Zil'fian, V. N. 1439
Zimmermann, B. 2967
Zimmermann, F. K. 2258
Zimmermann, G. 2952
Zimmerman, H. M. 524,1452
Zini, C. 489
Zintzsch, J. 2262
Zippin, C. 1997
Zironi, A. 1673
Zizi, P. 553
Zlatkov, N. B. 883
Zobl, H. 2382
Zur Hausen, H. 351,1550,1551,
  2102,2422,2640

SUBJECT INDEX

BNORMALITIES, CONGENITAL (See also under Genetics and Teratogenesis)
- aniridia, Wilms' tumor, child: 631,1304,1977,2963
- bone, neuroblastoma, infant, case and review: 177
- cancer risk, child: 167
- connective tissue tumors, child: 1329
- familial autosomal anomalies, leukemia or cancer: 424,1978,2748
- prenatal neuroblastoma and other tumors: 386
- skin (ichthyosis), with tongue cancer, child: 2467
- XO/XY sex chromosome mosaicism, gonadal tumor risk, review: 2509

BSORPTION, INTESTINAL
- benzpyrene, methylcholanthrene or dimethylbenzanthracene, rat: 2320

CETAMIDE (See also N-2-Fluorenylacetamide)
- hepatoma, effect of arginine glutamate, rat: 1744
- premalignant lesions, rat liver: 46

CETAMIDE, N-6-(3,4-BENZOCOUMARINYL)-
- mammary tumors, rat: 267

CETAMIDE, THIO-
- effect on
  - chromosomes, rat liver: 95
  - cortisone-induced enzyme, rat liver: 2328
- liver tumors, rat: 520,523,2182
- toxicity, liver, mechanism, rat: 2800

CETANILIDE
- effect on
  - fluorenylacetamide liver carcinogenesis, rat: 745
    - metabolism, rat: 744

CETIC ACID, DEHYDRO
- effect on dimethylaminoazobenzene carcinogenesis, rat liver: 28

-ACETYLAMINOFLUORENE (See N-2-Fluorenylacetamide)

CROLEIN
- cigarette smoke, mutagenesis, algae: 1720

DJUVANTS
- Freund's, effect on virus tumors, mouse or rat: 2621

DRENAL CORTEX
- benzanthracene derivative toxicity, rat: 496,2029,2033,2778
- cholesterol metabolism *in vitro*, effect of dimethylbenzanthracene, rat: 1477
- dimethylbenzanthracene toxicity, rat or mouse: 298,946,1412,1413,2284,2313,2777
- function
  - breast cancer: 1119
  - dimethylbenzanthracene mammary carcinogenesis, rat: 61
  - effect of ^{90}Sr aerosol, dog: 1381
- pathology, ^{90}Sr carcinogenesis, rat: 476
- progesterone-corticosteroid conversion, effect of dimethylbenzanthracene, rat: 2779

DRENAL NEOPLASMS
- congenital regressing and maturing neuroblastoma, siblings: 2468
- epidemiology
  - cattle, sheep and swine, Britain: 1070

ADRENAL NEOPLASMS (contd.)
  - relation to congenital defects, child: 167
- induction
  - dimethylbenzanthracene, mouse: 2578
  - oophorectomy + ACTH + somatotropin, rat: 1414
- pheochromocytoma, epidemiology, cattle, sheep and swine, Britain: 1070
  - with mucosal neuroma and thyroid carcinoma: 214
- primary adrenocortical melanoma, pathogenesis, review: 2745

AFLATOXIN(S)
- analysis
  - milk, method: 2792
  - soils and peanut products, Israel: 1461
- carcinogenesis, mechanism, review: 461
- effect on
  - nuclear ultrastructure, rat liver: 1741
  - nucleic acids and protein, chick embryo liver: 984
    - rat liver: 1742
- foods, Africa: 2790
  - hepatoma, Uganda (West Nile District): 2677
- induction of helical polysomes, rat liver: 2563
- isolation
  - aged or cured meat: 1228
  - *Streptomyces* from unidentified human lung disease: 536
- liver tumors
  - animal: 1225
  - rat: 746
  - review: 2208,2755
  - trout: 517
  - Uganda: 495,2677
- mechanism of action, review: 1145
- metabolism, milk, cow: 2793
- plasma binding *in vitro*: 530
- production, coconut medium: 2587
- stomach cancer, rodent (*Praomys natalensis*): 645
- synthesis, *Aspergillus*-contaminated plant substrates: 986
- toxicity
  - liver, animal: 1225
    - duckling: 2790
    - review: 1149,2208,2755
    - and testis, monkey: 2269
  - serum proteins, duckling: 1794
  - swine: 1795,2586
  - trout: 2585

AFLATOXIN B-1
- analysis
  - foods, method: 2791
  - peanut products, Taiwan: 1796
  - tobacco leaf and smoke: 78
- antitumor effects, rat hepatoma: 985
- effect on
  - dimethylbenzanthracene skin carcinogenesis, mouse: 2286
  - enzyme induction, rat liver: 988
  - liver proteins, rat: 522
  - rat liver: 743,1419

- AFLATOXIN B-1 (contd)
    - ultrastructure, rat liver: 1746
  - kidney tumors, rat: 2808
  - liver tumors, rat: 520,2808
    - trout: 1226,1227,1421,2270
  - lung tumors, mouse: 30
  - metabolism, liver, species differences (mouse and rat): 987
  - metabolite, analysis, method, cows' milk: 1417
  - toxicity, liver, rat: 1745
      - swine: 1740
- AFLATOXIN B-2
  - hepatoma, trout: 2270
- AFLATOXIN G-1
  - analysis, food, method: 2791
- AGE
  - breast cancer incidence changes ("Clemmesen's hook"), Scandinavia: 2948
  - difference, methylcholanthrene thyroiditis, rat: 2780
  - host immunity against cancer, review: 2510
- AIR
  - pressure, nasopharynx cancer, pilots of nonpressurized airplanes: 922
- AIR POLLUTION
  - asbestos, analytical methods and instruments: 1462
  - auto exhaust: 56,328,1463
  - 3,4-benzfluoranthene, analysis, method: 2528
  - benzpyrene
    - auto exhaust: 56,328
    - city street, West Germany (Heidelberg): 328
    - petrochemical plants, USSR: 1399
    - steel mill, Japan: 509
  - cancer incidence, France, study method: 2123
  - carcinogens, analysis, method: 938
  - chemical mutagens, screening method (mouse): 53
  - cigarette smoke, measurement: 2786
  - ^{137}Cs fallout, blood ^{137}Cs, geographical variations: 923
  - g.i. cancer, U.S., review: 2734
  - industrial areas, Belgium (Charleroi and Vilvorde): 713
  - irritant sensitivity, high- or low-pollution areas, children: 714
  - lead compounds, auto exhaust: 1463
  - lung cancer
    - asbestos bodies, Italy (Perugia): 2543,2544
    - Canada (immigrants or native-born): 1895
    - Czechoslovakia: 2114
    - Japan (Tokyo): 1929
    - New York (Buffalo): 2674
    - review: 1360
    - U.S., review: 2734
  - nitrogen dioxide, lung tumors, rat: 98
  - poisonous gases, cancer incidence, Ohio (Cleveland): 2439
  - potential carcinogens, WHO standards of permissible levels: 2771
  - ^{238}Pu fallout, analysis: 1179
  - pulmonary defense mechanisms, guinea pig: 2788
  - respiratory diseases (including cancer), Illinois (Chicago): 62,2932
  - soot and benzpyrene, heavy-traffic street: 328
  - stomach cancer, New York (Buffalo), ethnic groups: 2674
- ALBINISM
  - skin cancer, African Negroes (Uganda): 253
- ALCOHOL
  - beverages, nitrosamine content, Africa (Zambia): 960
  - ethyl, inhibition of spontaneous hepatoma, mouse: 2178
- ALCOHOL CONSUMPTION (See also under Dietary factors)
  - cancer incidence, France, study method: 2123
  - esophagus cancer
    - East Germany: 2132
    - Japan: 1635
    - Kenya (Western Nyanza region): 2926
    - Natal Africans: 1065
    - USSR (Kazakhstan): 609
  - larynx cancer, India: 2928
  - liver cancer, Japan: 1935
  - mouth cancer, India: 973
  - pancreas cancer, Japan: 1636
  - stomach cancer, Mexico: 610
  - upper respiratory cancer, Hungary: 1937
- ALKYLATING AGENTS (See under Antitumor agents)
- ALUMINUM COMPOUNDS
  - effect on nitroquinoline oxide lung tumors, mouse: 965
- AMIDES, AROMATIC
  - carcinogenesis, mechanism, review: 1142
- AMINES, AROMATIC
  - bladder, stomach or liver tumors, hamster: 1777
  - detoxication, guinea pig liver: 44
  - mammary tumors, rat: 267
  - metabolism, bladder cancer, review: 2733
- AMINO ACIDS
  - arginine, deficiency, effect on SV40 replication and antigens: 2888
  - dietary, effect on dimethylaminoazobenzene liver carcinogenesis, rat: 1427
  - DNA-bound, spontaneous or induced animal tumors: 2184
  - effect on adrenal toxicity of benzanthracene derivatives, rat: 2778
  - transport, polyoma virus-transformed cells: 2849
- AMINO ACID PEPTIDES
  - arginine glutamate, effect on acetamide hepatoma, rat: 1744
- AMINODIPHENYLMETHANE, 4,4'-DI-
  - liver toxicity and tumors, rat: 314
- AMINOPHENAZONE
  - leukemogenesis, child: 709
- AMYLOIDOSIS
  - virus, and plasma cell leukemia virus, mouse: 1672
- ANDROGENS (See under Hormones)
- ANILINE DERIVATIVES
  - dimethylaminoazobenzene type, liver tumors, rat: 497
- ANISOLE DERIVATIVES
  - premalignant skin lesions, guinea pig: 942
- ANTHRACENE
  - photodimers, infrared spectra: 1245
- 1,8,9-ANTHRACENETRIOL (anthralin; dithralin)
  - cocarcinogenesis, mouse: 301,302
- 2-ANTHRAMINE
  - mammary tumors, rat: 267

- NTHRANILIC ACID DERIVATIVES (tryptophan metabolites)
  - bladder tumors, mouse: 2550
- NTHRANILIC ACID, 3-HYDROXY- (tryptophan metabolite)
  - bladder tumors, effect of ascorbate, mouse: 2326
  - mutagenesis, human embryo cells: 2035,2529
  - tissue hapten, mouse: 977
  - urine, bladder cancer and smokers, effect of ascorbic acid: 2549
- NTIBIOTICS
  - chloramphenicol, leukemia, human: 2589
  - effect on nucleolar RNA, tumor cells: 1404
  - phleomycin, effect on SV40 and other viruses, cell culture: 2092
- NTICONVULSANTS
  - Hodgkin's disease: 1758
- NTIMONY
  - analysis, human tumors: 2970
  - trace levels, spontaneous tumor incidence, animal: 2291
- NTIOXIDANTS
  - effect on
    - benzpyrene carcinogenesis, mouse: 730
      - photodecomposition, culture media: 45
- NTITUMOR AGENTS
  - actinomycin D
    - effect on DNA, SV40-infected cells: 2375, 2885
      - normal and Friend virus-infected mouse erythropoietic tissue: 2629
    - interaction with methylcholanthrene, rat prostate *in vitro*: 2024
  - alkanesulfonates, s.c. tumors, chromosomes, rat or mouse: 2813
  - alkylating agents, teratogenesis, rat: 2781
  - antibiotics, s.c. sarcoma, mouse: 1491
  - antimetabolites, effect on tumor viruses, normal cells: 1567,1580,1618
  - asparaginase, effect on virus leukemia, mouse: 1604
    - synergism with LDH-elevating virus, mouse leukemia: 1649
  - clam extract, effect on adenovirus 12 tumors, hamster: 2421
  - cycloheximide, effect on SV40 DNA, monkey cells: 2647
  - cyclophosphamide
    - effect on tumor chromosomes, breast cancer: 655
      - viral sarcoma, mouse: 1611
    - immunochemotherapy, Moloney virus lymphoma, mouse: 2078
  - cytosine arabinoside, effect on Moloney sarcoma virus *in vitro*: 2080
  - effect on
    - dimethylbenzanthracene skin carcinogenesis, mouse: 2286
    - methylcholanthrene carcinogenesis, mouse: 1446
    - Rauscher virus leukemia, mouse: 1918
    - transplanted tumors, splenectomized or intact mouse: 195
- ANTITUMOR AGENTS (contd)
  - halogenated pyrimidines, effect on thymidine kinase induction, polyoma virus-infected mouse embryo cells: 2889
    - somatic cell lesions (wing), *Drosophila*: 1189
  - hydroxyurea, effect on polyoma virus, normal cells: 828
  - 6-mercaptopurine, lymphoma, cell-free passage, mouse: 1499
    - and porfiromycin, effect on Friend virus leukemia, mouse: 2389
  - nitrogen mustards
    - exptl. and human carcinogenesis, review: 1141
    - lung tumors, mouse: 2044,2045
    - s.c. tumors, chromosomes, rat or mouse: 2813
  - mutagenesis, bacteria (mouse infection), method: 2259
  - procarbazine, carcinogenesis, rat: 92
  - RNA-inhibiting, comparison with aflatoxin, chick embryo liver cells: 984
  - tumor stimulation, mouse: 83
- ARECAIDINE (See under Betel nut)
- ARECOLIDINE (See under Betel nut)
- ARECOLINE (See under Betel nut)
- ARSENIC
  - analysis, American cigarettes: 2537
  - drugs containing, skin cancer, human: 725
  - effect on methylcholanthrene skin tumors, mouse: 2557
  - occupational exposure
    - lung cancer: 1478
    - nasal septum perforation with cancer: 1729
    - skin cancer: 2329
      - review: 2731
  - skin cancer, human: 2588
  - trace levels, spontaneous tumor incidence, animal: 2291
- ARSENIC COMPOUNDS
  - effect on WBC chromosomes *in vitro*: 290
  - skin tumors, pathology, human: 289
- ARYLAMINES, CONJUGATED
  - structure-activity relationships, review: 2742
- ASBESTOS (See also under Silicates)
  - air, analysis, methods and instruments: 1462
  - carcinogenesis, review: 1134
  - environmental, pleural calcification and mesothelioma, review: 915
  - inclusion bodies, lung cancer: 494
      - Italy (Perugia): 2543,2544
    - pathogenesis, guinea pig lung: 1723
  - lung tumors, mouse: 1783
  - metal content: 1464
  - nickel content, significance, review: 1669
  - occupational exposure
    - lung cancer: 507,1204,1205,1207
      - California: 158
      - Italy (northern): 2541
      - Japan: 715
      - review: 14,1668,2731
      - smoking: 963
    - pleural or peritoneal mesothelioma: 962, 1201,1203,1204,1206

ASBESTOS (contd)
      Italy (northern): 2541
      review: 915,1162
      role of iron oxides: 1202
    smoking, Finland: 1208
  particles, effect on benzpyrene retention by lung, hamster: 2040
  "solid-state" carcinogenesis, review: 1140
  toxicity, pleura: 535
ASCORBIC ACID
  effect on hydroxyanthranilic acid bladder tumors, mouse: 2326
ASPHALT (See under Petroleum and petroleum products)
AUTOIMMUNITY (See under Immunity disorders)
AZOBENZENE, 4-AMINO-
  effect on chromosomes, rat liver: 95
  liver and other tumors, rat: 38
AZOBENZENE, 4-AMINO-3,4'-DIMETHOXY-
  liver and other tumors, rat: 38
AZOBENZENE, 4-AMINO-3-METHOXY-
  liver and other tumors, rat: 38
AZOBENZENE, 2',3-DIMETHYL-4-AMINO-
  liver protein binding, rat and mouse: 306
AZOBENZENE, 3,5-DIMETHYL-4-AMINO-
  liver protein binding, rat: 306
AZOBENZENE, N,N'-DIMETHYL-4-AMINO-
  liver tumors, pathogenesis, rat: 2564
AZOBENZENE, 7,12-DIMETHYLAMINO-
  hepatoma, antigens, rat: 1422
AZOBENZENE, 4-DIMETHYLAMINO-
  and analogs, liver tumors, rat: 497,701
  effect on
    chromosomes, rat liver: 95
    RNA, rat liver: 261
  hepatoma, mouse: 300
    rat: 28,96,516,518,519,757,978,1234,1236, 1427,1480,2054,2181,2278,2280,2803,2804
  liver antigens, rat: 979
    metabolism, effect of bacteriostatic agents, rat: 2803
    protein binding, rat: 306
  premalignant liver lesion, nucleotide deaminase, rat: 1761
AZOBENZENE, 3,5-DIMETHYL-4-(DIMETHYLAMINO)-
  liver protein binding, rat: 306
AZOBENZENE, N,N-DIMETHYL-2'-METHYL-4-AMINO-
  effect on liver amino acid-mobilizing enzymes, rat: 2057
AZOBENZENE, N,N-DIMETHYL-3'-METHYL-4-AMINO-
  effect on liver amino acid-mobilizing enzymes, rat: 2057
AZOBENZENE, N-METHYL-4-AMINO-
  and derivatives, mechanism of action, bacterial DNA: 1402
  liver metabolism, polar dye formation, rat: 1763
AZOBENZENE, 2-METHYL-4-DIMETHYLAMINO-
  binding, mechanism, rat: 1401
    effect on liver mitochondria, rat: 2279,2806
AZOBENZENE, 3'-METHYL-4-DIMETHYLAMINO-
  binding, mechanism, rat liver: 306,1401
  effect on
    chromosomes, rat liver: 95
    nuclear proteins, rat liver: 1237,1238
    nucleolus, rat liver: 521,743,2062
    ultrastructure, rat liver: 1424,2805
AZOBENZENE, 3'-METHYL-4-DIMETHYLAMINO- (contd)
  hepatoma, mouse: 1459,1460
    rat: 64,520,2089,2182,2189,2279,2565,2806
  premalignant liver tumor, DNA turnover, rat: 1426
AZOBENZENE, 4-METHYLDIMETHYLAMINO-
  premalignant liver lesion, nucleotide deaminase, rat: 1761
AZOBENZENE, 4'-METHYL-4-DIMETHYLAMINO-
  hepatoma, enzymes, rat: 2182
AZOBENZENE, 3'-METHYL-4-METHYLAMINO-
  hepatoma, cytoplasmic fibrils, rat: 1769
AZOBENZENE, 3'-METHYL-4-MONOMETHYLAMINO-
  N-demethylase, placental, smokers: 2539
AZOBENZENE DERIVATIVES
  methyl-5'-quinoline analogs, liver tumors, rat: 96
  4-substituted, liver and other tumors, rat: 38
AZO DYES
  liver carcinogenesis, mechanism, review: 224
  oxidation, mechanism: 2583
  Ponceau MX (food coloring), liver tumors, mouse: 2802
  structure-activity relationships, review: 2742
AZOTOLUENE, o-AMINO-
  effect on benzpyrene or dimethylbenzanthracene skin carcinogenesis, mouse: 731
5-AZOTOLUENE, 2-AMINO-
  liver tumors, effect of schistosomiasis, mouse: 2276
AZOXYMETHANOL, METHYL- (See Cycasin aglycone)
AZULENO(3,6,7-cd)PHENALENE
  s.c. sarcoma, mouse: 1495

BABESIOSIS
  vaccine, bovine leukosis transmission: 816
BACTERIA
  effect of nitroso compounds: 944
  intestinal, diet-related carcinogen production, g.i. cancer epidemiology: 2809
  skin saprophytes, carcinogen synthesis *in vitro*: 324
BACTERIOPHAGE
  induction, index of carcinogenic activity, nitroquinoline series: 1716
BACTERIOSTATIC AGENTS
  effect on dimethylaminoazobenzene liver metabolism and liver tumors, rat: 2803
BENZ(c)ACRIDINE
  bladder tumors, rat: 959
  isolation, edible oil, plants of poppy-fumaria group: 959
  skin tumors, mouse: 959
BENZ(c)ACRIDINE DERIVATIVES
  skin toxicity, bioassay, mouse: 1732
1,2-BENZANTHRACENE
  analysis, laser spectroscopy: 335
  effect on trachea *in vitro*, rat: 268,964
  mutagenesis, yeast: 2258
  photodimers, infrared spectra: 1245
  water pollution, petrochemical plants: 1398
1,2-BENZANTHRACENE DERIVATIVES
  adrenal toxicity, rat: 496

- 1,2-BENZANTHRACENE DERIVATIVES (contd)
  - structure-activity relationship, mammary tumors or sarcoma, rat: 2033
  - transformation, mouse prostate cultures, and skin tumor-initiating activity: 2811
- BENZANTHRACENE, 1,2,3,4-DI-
  - effect on DNA and RNA, mouse skin: 2281
- BENZANTHRACENE, 1:2,5:6-DI-
  - brain tumors, virus-like particles, mouse: 524,1452,2854
  - fibrosarcoma, transplantation antigen, guinea pig: 1465
  - leukemia, hamster: 1439
  - muscle tumors, virus-like particles, mouse: 1452
  - mutagenesis, yeast: 2258
  - skin tumors, mouse: 320,1736
- 1,2-BENZANTHRACENE, 4,5-DIMETHYL-
  - sarcoma, rat: 727
- 1,2-BENZANTHRACENE, 7,12-DIMETHYL-
  - adrenal tumors, mouse: 2578
  - carcinogenesis, immunity, mouse: 278
    - karyotype, rat: 264
  - cheek pouch tumors (hamster): 269,726,2810
    - drug effects: 269,299,2285,2556
  - chromosome abnormalities, strain differences, mouse: 2037
    - hamster bone marrow: 2533
  - composition for i.v. admin.: 1181
  - cytotoxicity, rat tissues: 1773,1789
  - derivatives, metabolic effects and toxicity, rat: 2029
  - distribution, animal: 717,739
  - DNA binding, mechanism, normal and tumor cells: 1240
    - peroxide-induced: 1408
  - effect on
    - adrenal progesterone-corticosteroid conversion, rat: 2779
    - adrenal, relationship to mammary carcinogenesis, rat: 61
    - cervix and vagina, mouse, review: 1150
    - cholesterol metabolism *in vitro*, rat adrenal: 1477
    - rat or mouse tissues: 1773,1789,2281
    - hydroxyaminoquinoline oxide skin tumors, mouse: 2558
    - immunity, mouse skin: 780
    - mitosis, normal and tumor cells: 945
    - pituitary prolactin and mammary gland, rat: 767
    - RNA, mouse skin: 2281
    - serum oncolytic activity, tumor-bearing rat: 949
    - ultrastructure, rat trachea: 268
  - enzyme induction, effect of thalidomide, rat liver: 527
  - epididymis tumors, animal: 287
  - g.i. tumors, rat: 2567
  - immunosuppression and toxicity, mouse: 2041
  - intestinal absorption, rat: 2320
  - leukemia
    - autoimmunity, rat: 1759
    - effect of bone marrow, mouse: 291
    - cortisone, mouse: 48
    - hamster: 1439
- BENZANTHRACENE, 7,12-DIMETHYL- (contd)
    - karyotype, rat: 710,1787,2043
    - mouse: 954
      - strain differences: 1725,2037,2735
    - strain and species differences (rat and mouse), review: 2735
    - susceptibility, mammary tumor virus-infected AKR mice: 2612
    - virus isolation, mouse: 787
  - liver tumors, mouse: 295,1725,1736
    - rat: 2567
  - lung tumors
    - effect of β-naphthoflavone, mouse: 1453
    - fetal mouse: 2263
    - radiation effects, rat or hamster: 2011
    - strain differences, mouse: 1725
  - lymphoma
    - fetal mouse: 2263
    - mouse: 2041
    - polyoma virus sensitivity, mouse: 1568
  - mammary tumors (rat): 267,310,2570
    - DNA-bound amino acids: 2184
    - effect of
      - environmental temperature: 312
      - β-naphthoflavone: 1453
      - hypothyroidism: 1488,1779
    - estrogen-induced or spontaneous secretion, ultrastructure: 2591
    - hormone effects and hormone metabolism: 50,276,279,283,1139,1434,1436,1487,1770,1780,2068,2302,2571,2572
    - lysosomal enzymes during regression: 2573
    - transplantable strains: 1489
  - metabolism
    - effect of other carcinogens, rat liver microsomes: 2028
    - liver, age and species differences: 749
    - normal, transformed or tumor cells: 1717
  - mutagenesis, *Saccharomyces*: 2258
  - ovary tumors
    - androgen-sterilized rat: 1434
    - fetal mouse: 2263
    - mouse: 954
  - resistance, mechanism, normal cells: 711
  - s.c. tumors
    - effect of adenovirus type 16, hamster: 2898
    - immunity, guinea pig: 758
      - hamster: 2288
    - liver lysosomes, rat: 2176
    - premalignant, mouse: 500
  - skin tumors
    - mouse: 265,286,318,500,731,739,1194,1197,1731,1735,1736,1776,1778,2284
      - chemotherapy: 2286
      - DNA metabolism: 2287
      - effect of $MgCl_2$: 320
      - hairless and/or asebic strains: 2283
      - radiation effects: 512
    - primate: 272,1191
    - promotion, mechanism, review: 1138
      - mouse: 1199,1200,1209
      - tobacco leaf extract or smoke, mouse: 66,2023
    - rabbit, effect of vitamin A acid: 34
    - rat, carbohydrate metabolism: 2478
      - hormone effects: 277

- BENZANTHRACENE, 7,12-DIMETHYL- (contd)
  - thymoma, mouse: 2042
    - host immunity: 1186
  - toxicity, adrenal, rat: 298,946,1412,1413, 2313,2777,2778
    - ovary and adrenal, mouse: 2284
  - transformation, tissue culture: 2034
  - tumor ultrastructure, rat: 1409
  - uptake, rat mammary gland: 1772,2319
  - visceral tumors, mouse: 318
- BENZANTHRACENE, 9,12-DIMETHYL-
  - effect on DNA, mouse liver: 2310
- BENZANTHRACENE, 7,12-DIMETHYL-5-FLUORO-
  - effect on rat trachea: 268
- BENZANTHRACENE, 7-HYDROXYMETHYL-12-METHYL-
  - adrenal toxicity, effect of amino acids, rat: 2778
- BENZANTHRACENE, 12-HYDROXYMETHYL-7-METHYL-
  - metabolism, rat liver microsomes: 2028
- 1,2-BENZANTHRACENE, 4,5,10-TRIMETHYL-
  - sarcoma, rat: 727
- 1,2-BENZANTHRACENE, 7,8,12-TRIMETHYL-
  - leukemia, karyotype, rat: 1787
    - mouse: 954
  - ovary tumors, mouse: 954
  - toxicity, rat: 954
- 7H-BENZ(de)ANTHRACEN-7-ONE
  - air pollution, analysis, method: 938
- BENZENE
  - acute leukemia with pseudo-Pelger anomaly: 489
  - leukemia, chromosomes, human: 2330,2331
  - occupational exposure, erythroleukemia: 2579
- BENZENE, 1-FLUORO-2,4-DINITRO-
  - skin tumor promotion, mouse: 1197
- 3,4-BENZFLUORANTHENE
  - analysis, air, method: 2528
- BENZIDINE
  - distribution, rat: 319
  - hapten component, rat serum and tissues: 2535
  - mammary tumors, rat: 267
- BENZIMIDAZOLE AND BENZTHIAZOLE DERIVATIVES
  - dimethylaminoazobenzene type, liver tumors, rat: 497
- 1,2-BENZPYRENE
  - chemical linkage to DNA, aqueous soln.: 2032
- BENZO(a)ACRIDINE DERIVATIVES
  - sarcoma, structure-activity relationship, mouse: 728
- BENZO-1:2b:4:5b-DITHIONAPHTHENE, 6,12-DIMETHYL-
  - fibrosarcoma, transplanted, effect on plasma proteins, mouse: 58
- BENZOQUINOLINE-69 (synthesized from β-naphthylamine)
  - liver and s.c. tumors, rat and mouse: 2553
- BENZO(rst)PENTAPHENE (See Benzpyrene, 3,4,9,10-di-)
- BENZOTHIAZOLE DERIVATIVES
  - benzpyrene hydroxylase induction, rat liver and lung: 1187
- 3,4-BENZPYRENE
  - analysis
    - air, city street, West Germany (Heidelberg): 328
      - petrochemical plants, USSR: 1399
      - steel mill, Japan: 509
- 3,4-BENZPYRENE (contd)
    - automobile exhaust: 56
    - petroleum and products: 707
    - plant oils: 329
    - rubber dust: 57
  - bladder tumors, mouse or rat: 2551
  - brain tumors, virus-like particles, mouse: 524,1452
  - cervicitis, effect of estrogen and podophyllin derivatives, hamster: 2576
  - cervix tumors, transplantation and *in vitro* transformation, mouse: 297
  - cheek pouch tumors and vascular abnormalities, hamster: 274
  - effect on
    - biliary thyroxine excretion, rat: 39
    - ciliary activity, salamander lung: 1479
    - liver cholesterol *in vitro* or *in vivo*, rat: 41
    - ultrastructure, rat trachea: 268
  - epididymis tumors, animal: 287
  - free radical formation, cell-free system: 705
  - hydroxylase
    - induction, rat liver and lung: 266,1187
    - placental, effect of cigarette smoke, rat and human: 2539
  - intestinal absorption, rat: 2320
  - intranuclear distribution, normal cells: 2257
  - leukemia, mouse: 954,2050
  - liver enzyme induction, effect of radiation and other chemicals, rat: 742
  - lung tumors, mouse: 2050,2249
  - metabolism
    - effect of methylcholanthrene, rat liver: 1429
      - β-naphthoflavone, mouse or rat: 1453
    - microsomal, liver cells: 2272,2273,2324, 2332
    - tissue culture: 1473
  - muscle tumors, virus-like particles, mouse: 1452
  - mutagenesis, yeast: 2258
  - photodecomposition, effect of antioxidants, culture media: 45
  - premalignant mammary hyperplasia, effect of androgen or light exposure, mouse: 2574
  - reaction with
    - chlorine peroxide, water supply: 325,326
    - DNA: 1407,1408,2032
    - nucleohistones, cell-free system: 491
    - vanadium pentoxide: 533
  - retention, lung, hamster or rat: 327,717,2040
  - s.c. tumors
    - cytochemistry, rat: 736
    - effect of antioxidants, mouse: 730
      - propyl gallate or vitamin E, mouse: 1447
  - skin tumors (mouse): 60,729,731
    - croton oil promotion, effect of griseofulvin: 1193
    - effect of polyethylene extracts: 1733
    - hexokinase activity: 2555
    - vital staining: 1443
  - stomach tumors, mouse: 91,2050
  - 6-substituted derivatives, effect on liver zoxazolamine- and hexobarbital-mobilizing enzymes, rat: 2060

- 3,4-BENZPYRENE (contd)
  - synthesis
    - fresh-water algae: 323
    - marine organisms: 1715,2333
    - skin saprophytes *in vitro*: 324
  - transformation, mouse prostate cultures, and skin tumor-initiating activity: 2811
  - tumor induction, effect of adenovirus 12-infected or transformed cells, hamster: 2322
  - water solubility, effect of caffeine and other additives: 281
- BENZPYRENE, 3,4,9,10-DI-
  - lung adenoma, effect of vehicles or derivatives, mouse: 1451
  - s.c. sarcoma
    - effect of
      - citrus oils, mouse: 2321
      - tobacco smoke extract or dibenzpyrene derivatives, mouse: 67
      - vehicles or derivatives, mouse: 1451
    - rapid induction method, hamster or mouse: 1448
- BENZPYRENE, 3,4,9,10-DE-, 5,8-QUINONE
  - antitumor effects, mouse: 67
- BERYLLIUM
  - bone tumors, rabbit: 534
  - occupational exposure, lung cancer, review: 2731
- BETEL NUT
  - alkaloids, carcinogenesis, review: 1989
  - chewing
    - gingiva cancer, India: 501
    - oral mucosa pathology, Ceylon: 2124
      - Papua/New Guinea: 397
    - oropharyngeal cancer, review: 1133
    - upper respiratory cancer, Cambodia: 862
- BILIARY TRACT DISEASES
  - calculi, cystic duct stump cancer, complication of cholecystectomy: 1334
    - gallbladder cancer: 391
- BILIARY TRACT NEOPLASMS (See also under Gallbladder neoplasms)
  - cystic duct remnant: 1334
  - epidemiology
    - Poland: 1924
    - review: 2218
    - Venezuela: 149
  - husband and wife, smoking: 1926
  - induction, nitrosoguanidine, rat: 1431
- BIPHENYL, 4-AMINO-
  - toxicity, dog: 764
- BIPHENYL, 4-AMINO-3:2'-DIMETHYL-
  - female genital tumors, rat: 765
  - intestinal tumors, rat: 950,2048
- BIPHENYL DERIVATIVES
  - liver tumors, mouse: 295
- BISMUTH SUBCARBONATE
  - lung tumors or fibrosarcoma, rat: 499
- BLADDER CARCINOGENESIS
  - animals and man, review: 2733
  - aromatic amines, hamster: 1777
  - benz(c)acridine, rat: 959
  - benzpyrene, mouse or rat: 2551
  - bracken fern (*Pteris aquilina*), cattle: 1222
    - animal, review: 1147
  - dibutylnitrosamine, guinea pig: 740
- BLADDER CARCINOGENESIS (contd)
  - fluorenylacetamide, strain and sex difference, mouse: 2255
  - formamide derivative, rat: 1471
  - hydroxyanthranilic acid, effect of ascorbate, mouse: 2326
  - 3-hydroxykynurenine, mouse: 87
  - methylcholanthrene, mouse or rat: 2551
  - β-naphthylamine, dog: 2552
    - monkey: 2253
    - rubber factory, England (Birmingham): 2937
  - occupational, diagnosis: 961
  - tryptophan, preneoplastic lesions, dog: 1774
  - tryptophan metabolites, mouse: 1766,2036,2550
- BLADDER NEOPLASMS
  - cell growth rates and ploidy: 2451
  - epidemiology
    - "Balkan nephritis" areas, Yugoslavia: 1951
    - cattle, Kenya, range plant species: 2161
      - review: 2733
    - children and adolescents, U.S., smoking: 2666
    - human, review: 2733
    - Japan, smoking: 1927,1932
    - Louisiana (New Orleans): 413
    - North Carolina (rural): 2667
    - Portuguese East Africa: 623
    - Transvaal: 401
    - worldwide: 2112
  - β-glucuronidase metabolism: 2488,2489
  - occupational, smoking, chemical factory workers, West Germany: 1455
  - RNA localization, comparison to normal tissue, rat or human: 2697
  - sarcoma frequency, cases and review: 2938
  - schistosomiasis, diagnosis, urinary LDH: 2171
    - Malagasy Republic (Majunga region): 2708
  - smoking
    - chemical factory workers, West Germany: 1455
    - children and adolescents, U.S.: 2666
    - Japan: 1927,1932
    - review: 914
    - and urbanization, U.S.: 975
    - urinary tryptophan metabolites, human: 1221,2549
- BLOOD
  - plasma, aflatoxin binding *in vitro*: 530
- BLOOD CELLS
  - granulocytes, ultrastructure and function, human: 102
  - infectious mononucleosis, leukemia-like DNA, RNA and protein content: 2387
  - lymphocytes, phytohemagglutinin transformation, Hodgkin's disease or leukemia: 2474
      - mitochondrial tetracycline fluorescence: 2475
      - normal human: 2473
  - RBC, mammary tumor virus content, naturally or artificially infected mouse: 135,1052
- BLOOD COAGULATION
  - activator (ellagic acid), tumor stimulation, rat: 1760
  - fibrinolysis, and tumor growth, mouse: 2812
  - metastasis formation, review: 2219
- BLOOD GROUPS
  - ABH secretion

- BLOOD GROUPS (contd)
  - breast and female genital cancer, Argentina (Buenos Aires): 2939
  - female genital cancer, Czechoslovakia (Prague): 2940
  - stomach cancer, review: 2744
  - ABO
    - breast cancer
      - Argentina (Buenos Aires): 2939
      - USSR: 636
      - West Germany: 411
    - female genital cancer
      - Argentina (Buenos Aires): 2939
      - Czechoslovakia (Prague): 2940
      - India: 1092
      - USSR: 636
      - West Germany: 411
    - gallbladder cancer, Germany (Berlin): 2675
    - human cancer: 1298
    - lung cancer: USSR: 636
    - stomach cancer
      - Mexico: 610
      - peptic ulcer, West Germany: 2135
      - Poland: 170
      - review: 2744
      - USSR: 636
  - acquisition of B antigen, colon cancer: 2465
  - Gc, human cancer, Australia: 637
  - haptoglobin types
    - female genital cancer, Czechoslovakia (Prague): 2155
    - human cancer: 1298
    - leukemia and related diseases: 2472
  - MN, P and Gm, human cancer: 1298
  - P factors, bronchus cancer, women, West Germany: 411
  - Rh
    - breast and female genital cancer, Argentina (Buenos Aires): 2929
    - gallbladder cancer, Germany (Berlin): 2675
    - human cancer: 1298
    - linkage with familial nevoid basal cell carcinoma syndrome: 1325
- BLOOD PRESSURE
  - portal hypertension, tumor stimulation, rat: 193
- BLOOD PROTEINS
  - α-globulins, methylcholanthrene sarcoma, germfree rat: 1190
  - antigenic component, benzidine-treated rat: 2535
  - carcinogen distribution, rat: 939
  - hemoglobin, effect of tobacco smoke, animal: 966
  - immunoglobulins, bovine leukosis: 1270
  - mouse with transplanted induced fibrosarcoma: 58
  - spontaneous myeloid or lymphatic leukemia, dog: 791
- BLOOD VESSELS
  - abnormalities, benzpyrene-induced cheek pouch tumor, hamster: 274
- BONE
  - fractures, fixation by intramedullary nails, acute leukemia: 483
- BONE (contd)
  - growth retardation, leukemia, child: 2482
- BONE DISEASE
  - fistulated osteomyelitis, transformation to carcinoma: 1123
- BONE MARROW
  - chromosomes, effect of dimethylbenzanthracene, hamster: 2533
  - kinetics of normal cells, mouse: 2452
  - radiation damage, erythroleukemia virus susceptibility, chick: 1171
  - toxicity, dimethylbenzanthracene and derivatives, rat: 2029
  - transfusion, effect on dimethylbenzanthracene leukemogenesis, mouse: 291
- BONE MARROW DISEASES (See also under Leukemia)
  - acute myelofibrosis, karyotype: 1987
  - non-leukemic, karyotype: 665
  - osteomyelofibrosis or osteomyelosclerosis, differential diagnosis, WBC enzymes: 1125
- BONE NEOPLASMS
  - benign, cartilaginous or chondroma types, malignant transformation: 2979,2980
  - epidemiology
    - ameloblastoma of jaw, Tanzania and Uganda: 2691
    - children, West Germany (Rheinland-Westfalen): 2934
    - dogs, USSR (Moscow): 2163
    - Great Britain: 2127
    - jaw tumors, Korea: 2692
    - Peru (Arequipa Province): 2693
  - Ewing's sarcoma, histogenesis: 434
  - fibrosarcoma, pre-existing diseases, human: 1165
  - giant cell tumor, frequency of malignant transformation: 2978
    - stimulated by pancreas carcinoma: 210
  - induction
    - beryllium, rabbit: 534
    - radioisotopes, animal: 485,698,1371,1379
    - simian adenovirus (SA7 group), hamster: 1845
  - osteosarcoma
    - epidemiology, France (Paris): 2935
      - Norway: 1629
    - human, virus isolation and hamster pathogenicity: 770,1061,2391
    - radiation-induced, child: 930,2009
      - virus isolation, mouse: 931
  - Paget's sarcoma, epidemiology, England (Leeds and Bristol): 2936
    - transformation phase, diagnosis, serum enzymes: 1124
  - pseudotumoral diseases, review: 2746
  - radiation-induced
    - child: 930,2009,2762
    - fibrosarcoma, human: 1165
    - pathology, mouse: 479
    - second primary tumors, child: 484
    - skull, human: 2233
    - species difference, rodent: 933
  - sarcoma, congenital defects, child: 167
    - serum virus antibodies, human: 2393
  - "solid-state" reaction to fibrosis, review: 1140

- BONE NEOPLASMS (contd)
  - tibial periosteum fibrosarcoma with skin carcinoma ("collision tumor"), unhealed
    - varicose ulcer: 2004
  - traumatic and other osteoma, review: 2728
- BORON
  - soil, nasopharynx cancer, Kenya: 2927
- BRAIN
  - progressive cerebellar ataxia (Louis-Bar syndrome), acute leukemia, siblings, family
    - cancer history: 2960
- BRAIN NEOPLASMS (See also under Nervous system neoplasms)
  - brain stem spongioblastoma, adolescent with transformed colon polyposis: 2707
  - ependymoblastoma, virus-like particles, mouse: 2416
  - epidemiology
    - Canada (Ontario): 1300
    - Ceylon: 1949
    - glial type, cyclic time changes: 155
    - Israel: 1069,1626
    - relationship to congenital defects, child: 167
    - worldwide: 2438
  - familial
    - hemangioblastoma (von Hippel-Lindau's syndrome): 1974
    - neonatal cerebellar medulloblastoma, siblings: 1642
    - siblings (children), U.S.: 152
    - von Recklinghausen's neurofibromatosis: 1640
  - foreign body-induced meningioma and hormone-stimulated ependymoma, adolescent: 1701
  - frequency, children: 2657
  - germ cell origin: 669
  - giant cell astrocytoma, histogenesis: 206
  - glioblastoma, cell growth kinetics: 1964
    - morphine stimulation *in vitro*, mouse: 2325
  - glioma, cell cultures: 1807
    - distribution (cerebral cortex), glial cell distribution: 1067
    - epidemiology, Poland (Cracow): 1948
    - pathogenesis, tissue culture: 2977
  - induction
    - adenovirus 12, mouse: 1558
    - avian adenovirus (CELO), hamster: 2367
    - benzpyrene, virus-like particles, mouse: 524,1452
    - bovine papilloma virus, calf: 1588
    - cycasin, rat: 94
    - dibenzanthracene, virus-like particles, mouse: 524,1452
    - elaiomycin, rat: 2052
    - ethylnitrosourea, fetal rat and hamster: 1727
    - methylcholanthrene, mouse: 487,2817
      - virus-like particles, mouse: 1452,1872, 2854
    - methylnitrosourea, enzymes, rat: 1241
      - orchiectomized rat: 2264
      - rabbit: 1243
      - rat: 280,1242,1728,2266
    - polyoma virus, rabbit: 2381,2899
    - Rous sarcoma virus, monkey: 1530
- BRAIN NEOPLASMS (contd)
      - mouse: 1529
      - puppy: 1869
    - simian adenovirus (SA7), hamster: 2366
    - SV20, hamster: 1007
    - urethan, rat: 259
  - medulloblastoma, cell growth kinetics: 1964
    - neurofibromatosis with malignant transformation (neurogenic sarcoma) and
      - radiation-induced thyroid cancer: 2018
  - metastatic, frequency, Switzerland (Geneva): 2656
  - oligodendroglioma, Grade II, trace element levels: 2970
    - pathogenesis of malignant transformation: 670
  - pinealoma and craniopharyngioma, epidemiology, Japan: 1946
  - primary meningeal melanoma, pathogenesis, review: 2745
  - radium-induced meningioma, human: 257
  - relationship to cranial injuries, human: 15
  - reticulum cell sarcoma, with malabsorption, human: 2464
  - spontaneous, domestic animals, cases and review: 2694
- BREAST NEOPLASMS (See Mammary neoplasms, human)
- BROMINE
  - analysis, human tumors: 2970
- BRONCHUS
  - ciliostasis, cigarette smoke, effect of filtration and oxolamine citrate, cat: 2787
  - epithelium, ultrastructure, normal dog: 1212
      - smoking, dog: 1213
  - pathology, smokers: 970
  - squamous metaplasia with atypia, singers or wind instrument players: 2238
  - tobacco smoke toxicity, rat: 2019
- BRONCHUS NEOPLASMS
  - asbestos exposure: 1204,1205
  - blood groups: 411,1298
  - epidemiology
    - Brazil (Rio de Janeiro): 2669
    - methods: 2931
    - peptic ulcer, Austria: 396
    - review: 249
    - Rumania: 647,648,2668
  - hypertrophic pulmonary osteoarthropathy: 1331
  - smoking
    - Africa (Rhodesia): 723
    - brothers: 1343
    - Rumania (Oradea): 2668
  - trace element levels: 2970
  - urbanization, Rumania: 647,648
- BURKITT LYMPHOMA VIRUS (See under Virus, herpes-type)
- BUTANE, 1,2,3,4-DIEPOXY-
  - mutagenesis, bacteria: 2775
- γ-BUTYROLACTONE (solvent)
  - jaw and testis tumors, rat: 2807

- CADMIUM
  - trace levels, spontaneous tumor incidence, animal: 2291

- CADMIUM CHLORIDE
  - testis tumors, androgen metabolism, rat: 59
    - enzymes, mouse: 956
- CAFFEINE
  - complex formation with carcinogens: 1182
  - mutagenesis, animal and human: 1185
- CALCIUM HYDROXIDE
  - cocarcinogenesis, tobacco and other plants (chewing), review: 1133
  - effect on oral mucosa, rat: 63
- CAPSICIN (*Capsicum annum* ALKALOID)
  - stimulation of plant tumors: 529
- CARBAMATE DERIVATIVES (See also under Urethan)
  - cocarcinogenesis, mechanism, mouse skin: 1736
- CARBAMATE, 1,1-DIPHENYL-2-PROPYNYL-N-CYCLOHEXYL-
  - multiple-organ tumors, rodent: 1476
- CARBOHYDRATES
  - metabolism, induced skin tumors, rat: 2478
- CARBON MONOXIDE
  - blood, smokers and nonsmokers, autopsy series, Los Angeles: 80
  - effect on liver carcinogenesis, mouse: 1459
- CARBON TETRACHLORIDE
  - effect on chromosomes, rat liver: 95
  - + methylcholanthrene, liver cirrhosis and hepatic vein thrombosis, rat: 1737
  - possible liver carcinogenesis, and alcoholic cirrhosis, human: 526
  - toxicity, liver, rat: 983
- CARCINOGENESIS
  - mechanism, review: 444,463,909
- CARCINOGENESIS, CHEMICAL (See also Cocarcinogenesis, Radiation carcinogenesis and Viral carcinogenesis)
  - animal and human, comparison, review: 1141
    - methods, review: 2206
  - aromatic amines and amides, mechanism, review: 1142
  - benzidine, antigenic serum and tissue components, rat: 2535
  - benzpyrene, effect of adenovirus 12-infected or transformed cells, hamster: 2322
  - betel nut alkaloids, animal, review: 1989
  - cell membrane phospholipid and cholesterol metabolism, review: 11
  - cocarcinogens, mechanism of action, review: 1137
  - combined action of carcinogens, review: 1160
  - diethylnitrosamine, pregnant rat and offspring: 737
  - dose-response relationship, mathematical model: 1468
  - enhancement by radiation, review: 2496
  - hamster, review: 907
  - historical review: 917,2497
  - hormone effects, mouse, review: 1695
  - immunity, review: 217,236,447,538,901,1359,2510
  - inbred and random-bred mice: 1435
  - industrial epoxy resin hardener and solvent, rat: 2807
  - intra- and extracellular control, review: 462
  - lung, animal, review: 683,1136
  - mammary or uterus, hormone dependence, review: 225
  - mechanism, mitochondrial mutation: 333
    - review: 221,444,450,1159,1999
- CARCINOGENESIS, CHEMICAL (contd)
  - newborn and infant mice, review: 1130
  - nickel, review: 1669
  - nitroquinoline series, relationship to phage-inducing activity: 1716
  - plastics and metals, mechanism, review: 2209
  - polycyclic aromatic hydrocarbons and conjugated arylamines, structure-activity relationships, review: 2742
  - skin of hand: 2765
  - "solid-state" type, review: 1140
  - strain differences, mouse, review: 226
  - tobacco smoke or alkaloids, experimental, review: 914,1989
  - tumor karyotype, animal, review: 1693
- CARCINOGENS, CHEMICAL
  - air pollution, lung cancer, review: 1360
    - WHO standards of permissible levels: 2771
  - animal and human responses, comparison, review: 1141
  - aromatic amines, liver detoxication mechanism (kynurenine formamidase), guinea pig: 44
  - chronic toxicity, testing methods: 2534
  - complex formation with biological substances: 1182
  - dietary, socioeconomic and occupational variation, stomach cancer, England + Wales: 2440
  - diet-related production by intestinal bacteria, colon-rectum cancer epidemiology: 2809
  - effect on
    - membranes as index of *in vivo* activities: 1457
    - nucleic acids, review: 1363
    - zoxazolamine paralysis, rat: 42
  - embryotoxic and teratogenic effects, rat: 288
  - environmental, mutagenesis, screening method (mouse): 53
    - pollution, U.S., review: 2734
    - review: 227,442,451,470,1157
  - foods and food additives, review: 680,1143, 2000,2736
  - formation from endogenous cholesterol: 2770
  - inactivation by vanadium pentoxide: 533
  - interaction with
    - cells *in vitro*: 1403
    - DNA and protein, cell-free system: 1430
    - nucleic acids, review: 1691
    - viruses, review: 445
  - malignant transformation, mechanism, hamster: 1474,1475
  - mechanism of action, review: 681,1666
  - mutagenesis, hamster cells *in vitro*: 1797
    - mouse: 1467
  - occupational exposure
    - bladder cancer: 961
    - cancer incidence, chemists, U.S.: 2245
    - ear-nose-throat cancer, review: 1135
  - polycyclic hydrocarbons, isolation from tobacco smoke, method: 84
    - rubber dust content: 57
  - screening, methods, rat: 702
    - review: 1127
    - newborn animals, review: 679
  - tobacco smoke content, effect of sodium nitrate: 55

CARCINOGENS, CHEMICAL (contd.)
  toxicity, liver, mechanism, review: 1663
  transformed cells, contact inhibition: 362
    effect of nitrosomethylurea: 712
CARDIOVASCULAR SYSTEM
  effect of smoking, human: 1217
CATIONS
  effect on mouse sarcoma virus *in vitro*: 1821
CELL GROWTH KINETICS
  acute leukemia, mechanism, review: 1102,1103
  avian sarcoma virus-transformed cells: 1833
  bladder or ureter cancer, human: 2451
  bovine leukosis: 1272
  breast cancer, mathematical model: 1366,1967
  cell membrane changes, review: 909,2756
  cervix cancer, human: 2453
    dysplasia to carcinoma *in situ*: 1318
  chronic leukemia: 1100,1101
  Ehrlich mouse carcinoma: 1652,1966
  erythropoiesis, rat: 1320
  fluorenylacetamide liver carcinogenesis, rat: 1482
  human cancer, measurement: 2701,2702
    glioma, tissue culture: 2977
    leukemia, review: 2754
  induced ear duct tumors, rat: 1965,2300
  larynx cancer: 2698
  liver carcinogenesis, mathematical model: 2695
  malignant tumors, review: 251,453,676
  mechanism of malignant transformation, review: 10
  mathematical model: 1104,1105,1106
  medullary and extramedullary hematopoiesis, chronic myeloid leukemia: 2958
  method of determination, mouse tumor: 2696
  mouth tumors: 2959
  neoplastic conversion, oxygen effects, mouse embryo cells: 1168
  normal and malignant cells: 1367,2177,2452
  radiation effects, mouse tumor or normal cells: 2699
    induced epidermal hyperplasia, guinea pig: 2014
  relation to glutaminase activity, rat hepatoma: 2450
  self-inhibition phenomenon, review: 2747
  stomach cancer, human: 2449
  suspension cultures, normal and polyoma-transformed cells: 1569
  SV40-infected monkey kidney cells, viral DNA synthesis: 2890
  untreated or irradiated radiation-induced rat sarcoma: 2700
CENTRAL NERVOUS SYSTEM NEOPLASMS (See under Brain neoplasms)
CERVIX UTERI
  benzpyrene cervicitis, effect of estrogen and podophyllin derivatives, hamster: 2576
  effect of hormones and carcinogens, mouse, review: 1150
    intrauterine contraceptive device, human: 2237
  non-malignant lesions, contraceptives, human: 31,2026
  recurrent polyps, cancer frequency: 2686
CERVIX UTERI NEOPLASMS
  adenocarcinoma, epidemiology: 2678
  atypical epithelial dysplasia, DNA content and aneuploidy: 2457
  blood groups: 636,1092,1298
  carcinogen-induced, epithelial-mesenchymal interactions, mouse: 2323
  carcinoma *in situ*, marker chromosomes: 2715
  cell growth kinetics: 615,1318,2453
  cervical stump: 858
  cytoplasm/nucleus ratio as index of malignancy, human: 420
  dermatomyositis: 2471
  diabetes mellitus: 1313
  diagnosis, methods: 1310,1311
  dysplasia and carcinoma *in situ*, malignant transformation: 1099
  epidemiology
    Africa (Moslem and non-Moslem nations): 151
    Australia (Woodville): 2944
    Barbados: 164
    Bulgaria (Moslem and non-Moslem): 633
    Canada: 620
    Connecticut: 1098
    Costa Rica (San José): 2941
    Czechoslovakia: 2114
    genital herpesvirus (Type 2) infection: 2905,2906,2907
    Georgia (Atlanta), genital herpesvirus infections: 2099,2679
    high- and low-risk groups: 1094
    Iceland: 2942
    India: 165,634,642
      (Agra), ethnic groups: 2156
    Italy: 630,1321,2946,2653
    Jamaica (Cayman Islands): 650
    Japan: 147,1634,1955
    methods: 1097,1624,2164,2165,2166,2680, 2681,2682,2684
      review: 443,469
    Mexico: 393,1623
    New Mexico, American Indians: 166,2157
    New York City: 1096,2112
    Northern Ireland: 1093,2943
    Norway: 1956
    Ohio (Cleveland or Toledo): 1095,2444
    Poland: 398,860,1924
    review: 450,2507
    Spain: 2683,2685
    Transvaal: 401
    USSR, regional variations: 2119
    Washington (Seattle), ethnic groups (American Indians): 1957
    worldwide: 2112
  etiology, review: 468
  family incidence: 1316
  HeLa cells, selective aggregate formation with chick embryo cells *in vitro*: 1049
  hereditary enzyme disorder, tumor enzyme metabolism: 667
  idiopathic thrombocytopenic purpura, herpes-type virus particles: 2100
  induction
    benzpyrene, mouse: 297
    contraceptives, human, review: 1662,2505, 2506

- CERVIX UTERI NEOPLASMS (contd)
      - mouse: 1490
    - methylcholanthrene, mouse: 953,1432,1753,1755,2575,2815
    - nitroquinoline oxide, rabbit: 37
  - karyotype: 1111,1963
  - LDH isoenzymes as index of malignancy: 2170
  - leukemia incidence after radiotherapy (Europe and U.S.): 20
  - malignancy-associated changes, pathogenesis: 1338
  - perimodal variations of DNA content: 2974
  - Peutz-Jeger syndrome, possible radiation carcinogenesis: 2169
  - polyps, malignant transformation, frequency: 2686
    - induction, contraceptives, human: 1754
  - possible transmission, *Trichomonas vaginalis*: 2456
  - premalignant
    - epidemiology, Mexico: 2945
      - USSR (Kirghiz SSR or Kazakhstan), ethnic groups: 1622,2120
    - induction, methylcholanthrene + estrogen, monkey: 952
    - possible virus-positive "halo" cells: 774
  - primary carcinoma and sarcoma: 1344
  - risk, prostitutes: 1312
  - sex chromosomes: 2458
- CHELATING AGENTS
  - effect on radioisotope bone tumors, rat: 485
- CHLORAMPHENICOL
  - acute leukemia, human: 2589
  - leukemia, human, review: 1667
- CHLORIDES
  - analysis, human tumors: 2970
- CHLORINE
  - water supply, toxicity, rat: 528
- CHLORINE PEROXIDE (ClO_2)
  - reaction with benzpyrene, water supply: 325, 326
- CHOLESTEROL
  - balance with phospholipids, relationship to tumor induction and growth, review: 11
  - effect on methylcholanthrene carcinogenesis, mouse: 735
- CHORIOCARCINOMA (See under Corpus uteri neoplasms)
- CHROMAFFIN TISSUE
  - possible hereditary differentiation defect with triple-tumor syndrome: 191
- CHROMIUM
  - occupational exposure
    - lung cancer, Japan: 1932
      - review: 2731
    - nasal septum perforation with cancer: 1729
  - s.c. sarcoma, rat: 2289
  - trace levels, spontaneous tumor incidence, animal: 2291
- CHROMOSOMES
  - adenovirus-infected cells or tumors: 351,1551,1556,2912
  - alkylating agent-induced s.c. tumors, rat or mouse: 2813
  - automatic analysis, apparatus and methods: 673
  - benzene-induced leukemia, human: 2330,2331
  - bladder or ureter cancer: 2451
- CHROMOSOMES (contd)
  - bovine leukosis: 842,1014
  - breast cancer (benign or malignant): 1112
  - carcinogen effects
    - hamster bone marrow: 2533
    - human embryo cells: 2035,2529
    - rat: 95
    - strain differences, mouse or rat: 264,2037
  - cell lines, animal tumor: 197,874,1346
    - human cancer: 659
    - leukemia and related diseases, human: 2485
    - review: 1991
  - cervix cancer: 1111,2457
  - chemically induced hepatoma, rat: 2189
  - clonal evolution
    - human leukemia: 873,2973
    - mouse mammary tumor: 654
    - treated breast cancer: 655
  - colon polyposis with/without cancer, familial: 661
  - dimethyl- or trimethylbenzanthracene-induced rat leukemia: 710,1787
  - DNA synthesis, animal tumor: 660
  - effect of arsenic, normal human WBC: 290
  - estrogen-induced pituitary tumors, male rat: 2304
  - familial autosomal anomalies with leukemia or cancer: 424,1978,2748
    - leukemia, parents and children: 2962
    - reticulum cell sarcoma: 181
  - female genital tumors, review: 2508
  - fragility, Fanconi's anemia, children: 2981
  - genetic transcription, effect of methylcholanthrene, rat liver: 2797
  - heterotransplanted human ovary tumor, hamster: 198
  - human cancer: 184,186,655,659,661,664,1109,1122,1340,2451,2457,2459,2719,2748
    - review: 233,452,455,1659,1693,2199,2224,2508,2513
  - immunoglobulin production, human normal or malignant lymph node cell lines: 433
    - plasma cell tumors, mouse: 1115
  - induced animal tumors, review: 1693
  - leukemia and related diseases, human: 181,182,192,196,204,211,344,418,424,432,433,466,525,873,1113,1114,1341,1347,1349,1645,1648,1650,1659,1978,1980,1982,1983,1984,1985,1986,1987,2174,2190,2192,2330,2331,2485,2715,2962,2973
  - LSD effects
    - addicts and their children: 1719
    - cell cultures, human: 2532
    - mouse germ cells: 2776
    - Ph^1-positive leukemia, addict: 525
    - plant or mammalian (hamster) cells: 2532
    - review: 2207
  - markers
    - acute myelofibrosis: 1987
    - Burkitt lymphoma cells: 344,1648
    - cervix carcinoma *in situ*: 2715
    - human cancer: 186,664
    - myeloma: 1645
    - virus-infected cells, review: 1675
  - "minimal-deviatior" rat hepatomas: 2486
  - mouse or rat leukemia: 2043,2191

- CHROMOSOMES (contd)
  - neuroblastoma, infant: 1340
  - non-leukemic bone marrow diseases: 665
  - ovary tumors: 1109
  - pigment-producing enzymes, hamster melanoma: 205
  - radiation effects
    - Hiroshima and Nagasaki: 25,926
    - human cancer: 1708
    - occupational radium exposure: 925
    - tumor cells *in vitro*: 471,2714
  - radiation-induced leukemia or lymphoma, mouse: 1170,2243
  - rat mammary tumors: 185,428
  - Rous virus sarcoma, mouse: 1527
  - sex
    - breast cancer: 1345,2716
    - duplication of Y chromosome, leukemia: 1348
    - female genital tumors: 429,669,2458,2718
    - lung cancer, women: 417
    - mesonephroma or colon tumor, women: 2717
    - ovary tumors: 662,1988,2972
    - trophoblastic tumors: 1110,1988,2193
    - variation with menstrual cycle, normal women: 871
    - XO/XY mosaicism, gonadal tumors, review: 2509
  - Shope virus papilloma: 356,357
  - specific abnormalities, tumor cells: 416,2492
  - SV40-transformed cells or SV40-induced tumors: 1859,2646
  - temperature effects, human cancer cells: 2714
  - transcription and translation, effect of estrogens: 674
  - transforming human WBC cell line: 1651
  - tumor virus-infected cells: 1841,2492
  - virus-containing human leukemia and Burkitt lymphoma cells: 1114,1260
  - Yoshida sarcoma and variants, rat: 872
- CHRYSENE, 6-AMINO-
  - liver and lung tumors, mouse: 2254
- CIRCUMCISION
  - cervix cancer, India: 642
  - penis cancer, India: 642,859
- COBALT
  - rhabdomyosarcoma, mechanism of action, rat: 2290
- COCARCINOGENESIS (See also Carcinogenesis, chemical)
  - croton oil and fractions, mechanism, review: 1138
    - mouse skin: 265,301,302,1200,1735
  - cyclopropenoid fatty acids, liver, trout: 1226,1227
  - mechanism, mouse skin or liver: 1736
    - review: 1137,1160,2737
  - plant oils, mouse skin: 1199
  - polyethylene extracts, benzpyrene-induced skin cancer, mouse: 1733
  - tobacco smoke + dimethylbenzanthracene, skin, mouse: 2023
  - tryptophan, bladder, dog: 1774
  - unburned tobacco extract, mouse: 1501
  - vitamin A and dimethylbenzanthracene, cheek pouch, hamster: 2285
- COCARCINOGENS (CHEMICAL)
  - isolation (plants of family *Euphorbiaceae*) and properties of croton oil fractions: 1199, 2527
  - lysosomal membrane effects as index of *in vivo* activities: 1457
  - phorbol esters (croton oil), isolation method: 1731
- COLLAGEN DISEASES (See under Immunity disorders)
- COLON
  - polyposis
    - incidence, comparison to cancer incidence: 616
    - malignant transformation: 661,2136,2967
      - associated brain tumor, adolescent: 2707
  - ulcerative colitis, tumor incidence: 208
- COLON NEOPLASMS
  - ABO blood groups, acquisition of B antigen, case: 2465
  - "cancer family" syndrome: 1976
  - differential diagnosis: 412
  - epidemiology
    - Argentina: 614
    - Canada (Manitoba), ethnic groups: 1308
    - East Germany, smoking: 2132
    - Israel, ethnic groups: 2138
    - Japan, environmental factors: 2137
    - review: 228
  - familial (brother, sister, father): 613
    - polyposis: 661,877,896
  - frequency, associated diseases: 2136
    - Gardner's syndrome (familial soft tissue masses, bony tumors and colon polyposis): 2967
  - hereditary, review: 910
  - induction, dimethylaminodiphenyl, effect of laxative, rat: 2048
  - inguinal hernia: 154
  - malignant, comparison to benign polyposis incidence: 612
  - polyposis, review: 2512
  - premalignant or malignant, diagnosis and treatment: 1118
  - rectocolitic polyps, risk of malignant transformation: 876
  - regional enteritis (Crohn's disease): 2172
  - sex chromosomes, woman: 2717
  - trace metal content, human: 2483
  - transverse colon or splenic flexure: 613
  - ulcerative colitis, risk, review: 1154
- CONGENITAL ANOMALIES (See Abnormalities, congenital)
- CONNECTIVE TISSUE COMPONENTS
  - chondroitin sulfate, tumor stimulation, mouse: 292
- CONNECTIVE TISSUE NEOPLASMS
  - benign fibrous xanthoma of synovium, joint disease and/or injury: 1944
  - congenital defects, child: 1329
    - rhabdomyosarcoma, familial nevoid basal cell carcinoma syndrome, child: 1324
  - epidemiology, siblings (children), U.S.: 152
  - fibrosarcoma, virus isolation: 776

- CONNECTIVE TISSUE NEOPLASMS (contd)
  - induction
    - 2- or 3-acetaminoestra-1,3,5(10)-triene, mouse: 85
    - antitumor agent (procarbazine), rat: 92
    - bis(N-methylanilino)methane, rat: 89
    - bis(morpholino)methane, rat: 89
    - methylcholanthrene, snail: 510
    - naphthene derivatives, plasma protein changes, mouse: 58
    - phenylnitrosourea, rat: 90
    - 4-substituted aminoazobenzenes, rat: 38
    - ^{90}Sr-^{90}Y, rat: 698
  - liposarcoma, head and neck, epidemiology, England: 1941
  - malignant synovioma, epidemiology, Ceylon (Colombo): 1945
  - muscle, carcinogen-induced, virus-like particles, mouse: 1452
  - radiation-induced, second primary, child: 484
  - rhabdomyosarcoma, child, attempted virus isolation: 548
    - ultrastructure: 1062
  - skull, review: 913
  - traumatic chondrosarcoma, knee joint: 1177
- CONTRACEPTIVES (See under Hormones)
- CONTRAST MEDIA
  - ethiodol, s.c. sarcoma, host immunity, mouse: 1192
- COPPER
  - effect on aflatoxin toxicity, swine: 1795
  - serum, effect of leukemia or sarcoma virus, mouse: 1882
  - soil, nasopharynx cancer, Kenya: 2927
- CORPUS UTERI
  - effect of methylcholanthrene, mouse: 2025
- CORPUS UTERI NEOPLASMS
  - blood groups (ABO, Rh, MN, P, Gm, haptoglobin): 1298
  - carcinosarcoma, cystosarcoma phylloides type, histogenesis: 203
  - endometrium
    - "cancer family" syndrome: 1926
    - diabetes mellitus: 617,1313
    - etiology, review: 2504
    - hereditary, review: 910
    - induction, contraceptives, human, review: 1662
    - pituitary-hypothalamus hyperfunction: 1330
    - sex chromosomes: 2458
    - sarcoma incidence, strain and environmental factors, mouse: 2183
  - epidemiology
    - Africa: 151
    - Canada: 620
    - high- and low-risk groups: 1094
    - Italy: 1321,2653,2946
    - Japan: 1634
    - New York City: 1096
    - Ohio (Toledo): 1095
  - hormone dependence, mechanism, review: 225
  - hydrometra, induction, 2- or 3-acetaminoestra-1,3,5(10)-triene, mouse: 85
  - induction
    - antitumor agent (procarbazine), rat: 92
    - elaiomycin, rat: 2052
- CORPUS UTERI NEOPLASMS (contd)
    - epoxy resin hardener (diaminodiphenylmethane), rat: 314
    - methylcholanthrene, hormone effects, mouse: 1753,2575
    - urethan, rat: 259
  - malignant transformation of cervical polyps, frequency: 2686
  - radiation-induced, human: 2760
  - radiotherapy complication, leukemia: 1699
  - trophoblastic (choriocarcinoma and related diseases)
    - epidemiology
      - Finland: 2947
      - Mexico City: 150
      - Puerto Rico: 1625
    - histocompatibility system of immunity: 1314
    - placental, transfer to fetus: 668
    - primary (human) and heterotransplanted (hamster), hormone-synthesizing cell line: 426
    - sex chromatin: 1110,1988,2193
    - ultrastructure: 2976
- CORTICOSTEROIDS (See under Hormones)
- CORTISONE ACETATE
  - effect on
    - dimethylbenzanthracene leukemogenesis, mouse: 48
    - Moloney virus sarcoma, mouse: 109
- COUMARIN, 3-METHYL-
  - cocarcinogenesis, liver, trout: 1226
- CROTON OIL
  - cocarcinogenesis, mechanism, mouse skin: 265, 301,302,1193,1199,1200,1735,1736
    - rat skin: 277
  - effect on DNA, mouse skin: 1730
  - fraction A-1, effect on DNA and RNA, mouse skin: 1497,2281
  - + methylcholanthrene, foot appendage tumors, snail: 2267
  - + urethan, skin tumors, effect of thymectomy, mouse: 2282
- CROTON OIL PHORBOL ESTERS
  - effect on nuclear RNA, mouse fibroblasts: 1781
  - isolation and properties: 1731,2527
  - mechanism of action, normal or SV40-transformed cells: 2027
    - review: 1138,2737
  - screening method (mouse skin): 1731
- CULTURE MEDIA
  - malignant transformation of mouse embryo cells: 890
- CYCAD NUTS
  - liver and kidney tumors, rat: 282
- CYCASIN (β-D-glucosyloxyazoxymethane)
  - kidney tumors, rat: 93,94,957
  - liver catalase, rat: 1718
  - mammary tumors, rat: 759
  - mechanism of action, review: 1146
  - metabolism, skin, fetal and newborn rat: 724
  - mutagenesis, *Salmonella*, mouse: 1405
- CYCASIN AGLYCONE (methylazoxymethanol)
  - distribution and toxicity, mouse or rat: 1793
  - liver and g.i. tumors and teratogenesis, hamster: 1784
  - mechanism of action, review: 1146

- CYCASIN AGLYCONE (methylazoxymethanol) (contd)
  - mutagenesis, *Salmonella* infection, mouse: 1405
  - toxicity, liver, rat: 983

- o,p'-DDD (See Ethane, 1,1-dichloro-2-(o-chlorophenyl)-2-(p-chlorophenyl)-)
- DEXTRAN
  - tumor stimulation, rabbit: 293
- DIABETES MELLITUS
  - cancer frequency: 616,1620,1621
  - female genital cancer: 617,1313
  - ureter cancer, human: 189
- DIET (See also under Foods)
  - cottonseed meal, aflatoxin hepatoma, trout: 1421
  - effect on radiation carcinogenesis, mouse: 1396,2012
  - lipotrope-deficient, fatty nutritional cirrhosis, rat: 1239
  - possible aflatoxin contamination, stomach cancer, rodent (*Praomys natalensis*): 645
  - proteins, effect on dimethylaminoazobenzene liver carcinogenesis, rat: 1427
    - dimethylnitrosamine liver toxicity, rat: 2799
- DIETARY FACTORS (See also under Alcohol consumption, Environmental factors and Foods)
  - cancer epidemiology
    - France, study methods: 2123
    - review: 680,1143,2000,2736
    - tropical Africa, review: 1661
  - colon-rectum cancer, Japan: 2137
  - esophagus cancer
    - Africa: 960,1065,1219,2926
    - Curacao: 1223,1224
    - East Germany: 2132
    - India: 959,2129
    - Japan: 1635
    - Kazakh SSR: 609
  - g.i. cancer
    - Czechoslovakia and U.S., comparison: 2922
    - England and Uganda, comparison: 2809
  - larynx cancer, India: 2928
  - leukemia endemic area, Poland, review: 2730
  - liver cancer, Africa: 401,495,623,2377
    - Japan: 1935
  - mouth cancer, India: 973
  - nasopharynx cancer, India: 959
  - pancreas cancer, Japan: 1636
  - "spontaneous" stomach tumor development, *Praomys* (*Mastomys*) *natalensis*: 645
  - stomach cancer
    - Czechoslovakia: 2134
    - England and Wales: 2440
    - Mexico: 610
    - worldwide: 162
  - upper respiratory cancer
    - Cambodia: 862
    - Hungary: 1937
- DIETHYLSTILBESTROL
  - pituitary tumors, rat: 2303,2304
- DIMETHYLBENZANTHRACENE (See Benzanthracene, 7,12-dimethyl-)
- DIMETHYL SULFATE
  - DNA and RNA alkylation, rat: 1410
  - metabolism, rat: 1400
- DIMETHYL SULFOXIDE
  - effect on
    - dimethylbenzanthracene tumors, hamster cheek pouch: 2556
    - hydroxyaminoquinoline oxide skin tumors, mouse: 2558
    - polyoma virus transformation, hamster cells: 2850
  - enhancement of "out-of-strain" leukemia, guinea pig: 2581
- DIPHENYLMETHANE, 4,4'-DIAMINO- (industrial epoxy resin hardener)
  - liver, kidney, mammary and pituitary tumors, rat: 2807
- DISEASE OUTBREAKS
  - reticulum cell sarcoma, Japanese quail colony, attempted virus isolation: 2406
- DISEASE TRANSMISSION
  - all tumors, dogs and their owners, California (Alameda County): 1292
  - bovine leukosis: 812,816
    - review: 678
  - cervix cancer
    - genital herpesvirus infection: 773,2099, 2679,2905,2906,2907
    - *Trichomonas* vaginitis: 2456
  - leukemia and lymphoma
    - human, review: 678
    - married couples: 187
    - pets and their owners: 163,644,2163
  - maternal-fetal, leukemia virus, mouse: 2337, 2338
  - solid tumors, pets and their owners: 1292
  - SV40 antibodies, rhesus monkeys to man, India: 1279
  - Yaba poxvirus, insect vectors, monkey colony (New York): 2384
- DISTRIBUTION
  - cycasin aglycone, mouse or rat: 1793
  - dimethylbenzanthracene, liver, kidney and skin, mouse: 739
  - hydroxyfluorenylacetamide glucuronide, rat: 2064
  - radioisotopes
    - dog: 1386,1387,1388
    - inhalation, dog: 1372,1373,1374,1382,1392
      - mouse or rat: 1390,1391
    - measurement, method: 1394
    - preparation of biological samples, method: 1393
    - rat: 1389
- DITHRALIN (See 1,8,9-Anthracenetriol)
- DMBA (See Benzanthracene, 7,12-dimethyl-)
- DRUG ADDICTION (See also under Hallucinogens)
  - LSD
    - cancer risk, review: 2207
    - chromosome abnormalities, mothers and children: 1719
  - multiple (LSD, mescaline, marijuana, barbiturates), acute leukemia: 525
  - phenacetin, kidney cancer, human: 1751
- DUST
  - occupational exposure, lung cancer risk, Japan: 715

- EAR DUCT NEOPLASMS
  - induction
    - dimethylaminostilbene, rat: 1965,2298,2299, 2300
    - dimethylbenzanthracene, rat: 1409
    - fluorenylacetamide, rat: 86
    - nitrosobutylurea, rat: 2580
    - 4-substituted aminoazobenzenes, rat: 38
- EB VIRUS (See under Virus, herpes-type)
- ELAIOMYCIN (Streptomyces hepaticus)
  - g.i., CNS and other tumors, rat: 2052
- ELLAGIC ACID
  - tumor stimulation, rat: 1760
- EMBRYO
  - effect of carcinogens, rat: 288
  - sea urchin, effect of nitroquinoline and nitroquinoline-1-oxide: 943
- ENDOCRINE ABLATION (See also under Hormones)
  - effect on
    - adenovirus-induced tumors, hamster: 1561
    - carcinogen uptake, rat mammary gland: 2319
    - dimethylbenzanthracene tumors or toxicity, rat: 277,283,298,1770,2068,2571
    - fluorenyldiacetamide hepatoma, rat: 1235, 1775
    - liver carcinogenesis, rat, review: 1665
    - mammary gland, mouse: 215
    - methylcholanthrene cervix or uterus cancer, mouse: 953,1753
    - methylnitrosourea induction of CNA tumors, rat: 2264
    - tumors in intrasplenic ovary graft, rat: 1433
  - oophorectomy + hormones, adrenocortical adenoma, rat: 1414
  - tumor stimulation, rat: 761
- ENDOCRINE NEOPLASMS
  - epidemiology, cattle, sheep and swine, Britain: 1070
- ENDOCRINE ORGANS
  - avian leukosis virus multiplication, chicken: 1263
- ENDOMETRIUM (See under Corpus uteri)
- ENDOTOXINS
  - effect on methylcholanthrene skin tumors, mouse: 1496
- ENVIRONMENTAL FACTORS (See also under Air pollution, Dietary factors, Occupational diseases, Water pollution, etc.)
  - air pressure, nasopharynx cancer, pilots of nonpressurized airplanes: 922
  - asbestos exposure, pleural calcification and mesothelioma, review: 915
  - "Balkan nephritis" syndrome, urothelial tumors, Yugoslavia: 1951
  - carcinogen detection method (mutagenesis, mice): 53
  - cancer epidemiology
    - regional variations, USSR: 2119,2120
    - review: 53,227,442,451,467,470,1157
    - tropical Africa, review: 1661
  - climate, skin cancer, Canary Islands (Tenerife): 2126
  - g.i. cancer, East Germany: 2132
  - Hodgkin's disease (seasonal, geographical, occupational), U.S.: 1297,2147,2772
- ENVIRONMENTAL FACTORS (contd)
  - isolation or crowding, endometrial sarcoma, mouse: 2183
    - transplanted tumors, mouse: 1339
  - leukemia, children, Ohio (Cleveland and suburbs): 1294
  - light, effect on liver or mammary carcinogenesis, mouse: 1460,2574
  - marital status, breast or female genital cancer, U.S.: 2150,2154
  - seasonal, birth rates of cancer pts., Northern Hemisphere and Australia: 1925
    - virus in frog kidney tumors: 2111
  - socioeconomic and occupational, stomach cancer, England + Wales: 2440
  - stomach cancer and peptic ulcer: 1934
  - temperature, effect on dimethylbenzanthracene mammary carcinogenesis, rat: 312
  - time-space leukemia distribution, adults and children, New Zealand: 1632
  - urbanization
    - all tumors, Hungary, rural: 146
    - breast cancer, Poland: 156
    - cervix cancer, Poland: 860
    - kidney tumors, U.S., smoking: 975
    - leukemia, U.S.: 975
    - respiratory cancer, Britain (London): 159
      - Rumania: 647,648
      - U.S.: 975,2674,2932
    - seminoma of testis, England and Wales: 2158
    - stomach cancer, New York (Buffalo): 2674
    - urinary cancer, U.S.: 975
- ENZYMES
  - acid phosphatase, carcinogen effects, rat liver: 2796
  - alcohol dehydrogenase, effect of tobacco smoke, cell-free system: 1458
  - alkaline phosphatase
    - human leukemia: 1125,1659,1982,1983,1984
    - leukemia virus infection, mouse: 784
    - liver, bioassay of radiation leukemia-protective factor, mouse: 2517
    - osteitis deformans (Paget's disease) with malignant transformation: 1124
    - variant, human liver tumors: 2476
  - amino acid-mobilizing, effect of carcinogens, rat liver: 2056,2057
  - aminoazo dye N-demethylase, placenta, smoking, human: 2539
  - aminolevulinic acid synthetase, effect of leukemia virus, mouse spleen or liver: 1602,2597
  - asparaginase, antileukemic effects, mouse: 1604,1649
  - ATPase, membrane-bound, methylcholanthrene skin tumors, mouse: 1444
  - azo dye demethylase, effect of methylcholanthrene, rat liver: 2055
  - benzpyrene hydroxylase
    - induction, effect of flavones, rat liver and lung: 266
      - structure-activity relationship (phenylbenzothiazole series), rat liver and lung: 1187
    - metabolism, liver cells: 2272,2273

ENZYMES (contd.)
    - placenta, smoking, rat and human: 2539
- carbohydrate-mobilizing
    - liver tumors, rat: 1739,2058
    - induced skin tumors, rat: 2478
- catalase
    - effect of cycasin, rat liver: 1718
    - liver, virus-induced leukemia, mouse: 601,2602
- $CdCl_2$-induced testis tumors, mouse: 956
- cell membrane, virus-transformed cells: 1575
- cytoplasmic, release into medium, normal or malignant cell cultures: 2975
- damage by atmospheric $^{14}CO_2$, mechanism: 2227
- diethylnitrosamine liver carcinogenesis, rat: 753
- distribution, methylnitrosourea-induced nerve tumors, rat: 2265
- DNA-mobilizing
    - effect of antimetabolites, polyoma-infected normal cells: 1567
    - properties, Shope fibroma virus: 588,841
- DNA polymerase
    - adenovirus-infected cells: 2638
    - binding to polyoma virus DNA: 1916
- glucose-ATP phosphotransferases, kidney, liver and mammary tumors, rat: 2711
- glucose-6-phosphatase
    - deficiency (Type I glycogen storage disease), hepatoma, brothers: 1328
    - rat hepatoma: 1236,2278
- glucose-6-phosphate dehydrogenase
    - deficiency, cancer incidence, Italy (Sardinia): 2167
    - hereditary disorder with cervix cancer, tumor enzymology: 667
    - induced hepatoma, rat: 752,2189
- β-glucuronidase, bladder cancer: 2488,2489
- glutaminase, relationship to growth rate, rat hepatoma: 2450
- glycolytic
    - induced skin tumors, monkey: 272
    - rat hepatoma: 978
    - glycosidases, SV40- or polyoma virus-transformed cells: 2617
- hexobarbital-mobilizing, effect of benzpyrene derivatives, rat liver: 2060
- hexokinase, benzpyrene skin tumors, mouse: 2555
- hydroxyfluorenylacetamide activation, structure of nucleic acid adducts: 1486
- kynurenine formamidase, detoxication of aromatic amine carcinogens, guinea pig liver: 44
- lactate dehydrogenase
    - diagnosis, schistosomiasis with malignant transformation: 2171
    - induced kidney tumor, rat: 768,769
    - isoenzymes, index of malignancy, cervix cancer: 2170
    - liver, bioassay of radiation leukemia-protective factor, mouse: 2517
- lipid-mobilizing, effect of fluorenylacetamide, rat liver: 2058
- liver, induction, rat: 527,742,751,2182
- lysosomal, regressing dimethylbenzanthracene-induced mammary tumors, rat: 2573

ENZYMES (contd.)
- menadione reductase and fluorenylacetamide hydroxylase, effect of dimethylbenzanthracene and derivatives, rat: 2029
- metabolism
    - alveolar macrophages, lung tumors of smokers and non-smokers: 1211
    - benzpyrene or methylcholanthrene sarcoma, rat: 736
    - viral carcinogenesis, review: 2741
- methylnitrosourea-induced CNS tumors, rat: 1241
- methylcholanthrene-induced premalignant brain tumors, mouse: 2817
- microsomal, effect of methylcholanthrene, rat liver: 747,748
- neuraminidase, effect on tumor-specific immunity, methylcholanthrene sarcoma, mouse: 2296
- nucleoside- and nucleotide-mobilizing, induced liver tumors, rat: 1738,1739,1761
- oxidative, viral papilloma, calf: 2851
- phospholipase C, effect on Shope fibroma virus, normal cells: 117
- pigment-producing, chromosome morphology, hamster melanoma: 205
- RNase, carcinogen effects, rat liver: 2796
- RNA-associated nuclease, avian myeloblastosis or parainfluenza virus: 2863
- RNA methylase
    - adenovirus-induced hamster tumor: 349
    - normal and tumor cells: 2186
- RNA polymerase
    - effect of
        - carcinogen, rat liver: 1231
        - Friend leukemia virus, mouse spleen: 124
        - Shope fibroma virus, normal cells: 1586
    - Rous sarcoma virus-infected cells: 1829
    - spleen, virus-induced mouse leukemia, properties: 2344
    - SV40-infected normal cells: 570
- thymidine kinase
    - adenovirus-infected cells: 2638
    - deficient cell line, polyoma virus infection: 2376
    - induction, effect of antimetabolites, polyoma virus-infected mouse embryo cells: 2889
    - Shope fibroma virus-infected human cells: 1865
- transfer RNA methylase, properties, adenovirus 12-induced hamster tumor: 2613
    - virus-induced liver tumor, chick: 2437
- tryptophan oxygenase (cortisone-induced), effect of thioacetamide, rat liver: 2328
- tryptophan pyrrolase and tyrosine transaminase, induction, effect of aflatoxin, rat liver: 988
- uridine diphosphate glucuronyltransferase, effect of methylcholanthrene, rat liver: 2317
- zoxazolamine hydrolase, effect of carcinogens, rat liver: 2053,2060

EPIDEMIOLOGY
- all tumors

EPIDEMIOLOGY (contd.)

  - alcoholism, air pollution and smoking, France: 2123
  - bovine leukosis-enzootic farms, Poland (Cracow): 1637
  - Brazil (Recife Province): 626
  - Bulgaria: 2117
    - TB mortality: 867
  - Canada (Ontario): 621
  - California, pets and their owners: 1292
  - chemists, U.S.: 2245
  - children, India (Pondicherry); children: 2950
    - children, review: 2217
  - Denmark: 624
  - diabetes mellitus: 1620,1621
  - dogs and their owners, California (Alameda County): 1292
  - domestic animals and their owners, USSR: 2163
  - East Germany: 2116
  - environmental microelements, review: 218
  - Hungary, rural: 146
  - Israel, children, ethnic groups: 1286
  - Italy: 627,629,1322,2653,2655
    - Sardinia, glucose-6-phosphate dehydrogenase deficiency: 2167
  - Japan: 2448
  - Natal Africans: 1065
  - New York City, appendectomy: 1076
  - Nigeria (Lagos): 652
  - offspring of women with breast cancer: 1953
  - Poland: 855,1317,1924
  - Portuguese East Africa: 623
  - relatives of children with leukemia: 1979
  - Rumania, registration methods: 2115
  - San Marino: 2654
  - Scotland: 1287
  - seasonal variations, Northern Hemisphere and Australia: 1925
  - South Vietnam (Saigon): 1066
  - SV40 antibodies, India: 1279
  - tropical Africa, review: 1661
  - U.S.: 2454
    - Canada border areas, comparison: 622
    - males: 2455
    - siblings, children: 152
  - USSR, regional variations: 2119
    - Leningrad, TB: 1082
  - West Germany (Düsseldorf): 854
  - worldwide, sex difference: 2121,2122
  - Yugoslavia (Split): 2652
- ameloblastoma of jaw, Africa: 1942,2691
- asbestosis, smoking, Finland: 1208
- avian leukosis, control, Hungary: 799
- biliary tract cancer, husband and wife: 1926
  - review: 2218
- bladder cancer
  - children and adolescents, U.S., smoking: 2666
  - Japan, smoking: 1927,1932
  - Louisiana (New Orleans): 413
  - β-naphthylamine exposure, rubber factory, England (Birmingham): 2937
  - North Carolina (rural): 2667
  - review: 2733

EPIDEMIOLOGY (contd.)

  - schistosomiasis, Malagasy Republic (Majunga region): 2708
  - South Africa (Transvaal): 401
  - Yugoslavia; "Balkan nephritis" areas: 1951
- bone tumors
  - Britain: 2127
    - Paget's sarcoma: 2936
  - France (Paris): 2935
  - Norway: 1629
  - Peru (Arequipa Province): 2693
  - West Germany (Rheinland-Westfalen); children: 2934
- brain tumors
  - Ceylon: 1949
  - Israel: 1069,1626
  - metastatic, Switzerland (Geneva): 2656
  - Poland (Cracow): 1948
  - West Germany, children: 2657
  - worldwide: 2438
- breast cancer
  - ABO and Rh blood groups, Argentina (Buenos Aires): 2939
  - Africa: 151
  - age changes ("Clemmesen's hook"), Scandinavia: 2948
  - calculation of relative risk, review: 1997,2149,2215
  - California: 2445,2446
  - Czechoslovakia: 2114
  - England (southeastern): 2148
  - goiter region, USSR (Ukraine): 638
  - Hawaii, ethnic groups (Japanese): 2687
  - Italy (Ferrara): 1321
  - males, prognosis: 2447
  - mammography, review: 2216
  - mass screening method: 640
  - New York City: 2153
  - Poland (Warsaw and rural): 156
  - pregnancy, Northern Ireland: 2152
  - premalignant and benign tumors, Tennessee (Nashville): 2949
  - Tennessee (Nashville): 2949
  - U.S.: 2150,2151
  - worldwide: 2113
- bronchial cancer, Austria: 396
  - methods: 2931
  - review: 249
- bronchogenic carcinoma *in situ*, screening of asymptomatic smokers: 2546
- Burkitt lymphoma
  - Africa and U.S., review: 2753
  - Brazil: 2146
  - Congo (Katanga): 1296
  - Kenya (western): 2926
  - Norway, children: 400
  - Poland (Szczecin): 1075
  - possible association with malaria, review: 1156
  - Sierra Leone; children: 2442
- calculation of relative risk, mathematical models: 2920
- cervix cancer
  - adenocarcinoma: 2678
  - Africa: 151
  - American Indians, U.S.: 166,1957,2157

- EPIDEMIOLOGY (contd.)
    - Australia (Woodville): 2944
    - Barbados: 164
    - Canada: 620
    - Connecticut: 1098
    - contraceptives, review: 2506
    - Costa Rica (San José): 2941
    - Czechoslovakia: 2114,2680
    - Denmark, contraceptives, review: 2505
    - genital herpes (Type 2) infection: 2099, 2679,2905,2906,2907
    - Georgia (Atlanta), cluster: 2099,2679
    - high- and low-risk groups: 1094
    - Iceland: 1954,2942
    - India: 165,634,642,2156
    - Italy: 630,1321,2946
    - Jamaica (Cayman Islands): 650
    - Japan: 147,1634,1955
    - Mexico: 393,1623
    - New York City: 1096
    - New Mexico, ethnic groups (American Indians): 2157
    - Northern Ireland: 1093,2943
    - Norway: 1956
    - Ohio: 1095,2444
    - Poland: 398,860
    - premalignant, Bulgaria (Moslem and non-Moslem): 633
        - dysplasia, carcinoma *in situ*, Boston: 1099
            - methods: 1318
            - Mexico: 2945
        - USSR (Kazakhstan), ethnic groups: 1622
    - review: 450,469,2507
    - risk, prostitutes: 1312
    - screening methods: 1097,1624,2164,2165, 2166,2680,2684
    - South Africa (Transvaal): 401
    - Spain: 2683,2685
    - *Trichomonas vaginalis* infections, Canada (Quebec): 2456
    - Washington (Seattle), ethnic groups: 1957
  - choriocarcinoma and related diseases
    - Finland: 2947
    - Mexico City: 150
    - Puerto Rico: 1625
  - colon and rectum cancer
    - Argentina: 614
    - carcinogen production by intestinal bacteria, England and Uganda: 2809
    - dietary factors, U.S. and Czechoslovakia: 2922
    - Israel, ethnic groups: 2138
    - Japan, environmental factors: 2137
  - ear/nose/throat tumors
    - children, Germany: 410
    - smoking and occupation, Hungary: 1937
  - esophagus cancer
    - Africa, dietary factors: 1065,1219,2926
    - Curacao, plant remedies: 1223,1224
        - water pollution: 1223
    - East Germany, smoking and alcohol consumption: 2132
    - India, dietary factors: 959,2129
    - Japan, dietary factors: 1635
        - smoking: 1635

- EPIDEMIOLOGY (contd.)
    - Kazakh SSR, dietary factors: 609
    - Korea: 921
    - South Africa (Transkei), environmental factors: 1219,1638
    - Wales, ethnic groups (Welsh and non-Welsh), sex difference: 2924
    - worldwide: 2112
  - eye tumors, Japan: 2953
  - female genital cancer
    - blood groups, Argentina (Buenos Aires): 2939
    - Czechoslovakia (Prague): 2155,2940
    - Germany (Jena): 1091
    - Iceland: 2942
    - marital status, U.S.: 2150,2154
    - worldwide: 2113
  - 15 tumors, worldwide: 2112
  - gallbladder cancer
    - blood groups (ABO and Rh), Germany (Berlin): 2675
    - review: 2218
    - Texas (San Antonio), ethnic groups: 2131
  - g.i. cancer
    - Canada (Manitoba), ethnic groups: 1308
    - Chile: 1969
    - Connecticut: 1080
    - East Germany: 2132
    - Kenya (western): 2926
    - U.S.: 2923
        - environmental pollution, review: 2734
    - Venezuela: 149
    - worldwide: 2113
  - head and neck tumors
    - children, Poland (Gdańsk): 2951
    - Germany (Freiburg): 2659
    - Japan (Toyama Prefecture): 1938
    - liposarcoma, England: 1941
  - heart metastases, Norway (Bergen): 868
  - Hodgkin's disease
    - environmental factors (climate, occupation, region), U.S.: 1297,2147,2772
    - review: 905
    - sex ratio, worldwide: 2664
  - jaw tumors, Korea: 2692
  - kidney tumors, adolescence: 2665
  - larynx cancer
    - children and adolescents, case and review: 2130
    - Connecticut, smoking: 1081
    - Hungary, smoking: 635
    - India (Assam): 2928
    - Italy, TB: 1970
    - Japan, smoking: 1936
    - sex difference, Czechoslovakia (Prague): 384
  - leukemia
    - aged, review: 2503
    - bovine leukosis areas, Denmark: 555
        - Latvian SSR: 1958
        - soil pH and magnesium, Poland, review: 2730
    - children
        - Australia, polio vaccination: 1054
        - California: 651,1639
            - mongolism: 663

EPIDEMIOLOGY (contd.)
        twins: 2144
      India (Pondicherry): 2950
      Israel, ethnic groups: 403
      methods, Poland: 1285
      Michigan, birth order and maternal age: 2142
      Ohio (Cleveland and suburbs): 1294
    Denmark: 555
    Hawaii: 1072
    hemoglobin type, Italy: 2472
    Iraq (Baghdad): 1295
    Italy (Turin): 1073
    Japan: 865,1950,2145
      Hiroshima and Nagasaki: 1697,1698
    Minnesota (Olmsted County): 1071
    New Zealand, siblings and other relatives: 2143
      time-space distribution: 1632
    radiation exposure, review: 2203
    rheumatoid arthritis and related diseases: 2141
    Sweden: 554
    USSR, ethnic groups (Russians and Jews): 1980
    West Germany: 2140
  liver cancer
    Africa, dietary factors: 401,495,623,2677
    children, review: 2502
      U.S.: 168
    dietary factors, review: 1143,2208
    India: 642
    Japan: 857
      smoking and dietary factors: 1935
    Mexico City: 649
    Scotland (Glasgow and western areas): 856
  lung cancer
    adenocarcinoma frequency, smoking: 2125
    air pollution: 1085,1929
    alcohol consumption, Hungary: 1337
    Australia: 1302
    Brazil (Rio): 2669
    Britain, urban (southern London): 159
    California, occupation: 158
      women, ethnic groups (Mexican), smoking: 32
    Canada, ethnic groups and smoking: 1085
    Czechoslovakia: 2114,2134
    exposure to poisonous gases, Ohio (Cleveland): 2439
    France (Bordeaux): 2671
    Germany (Leipzig): 385
    Italy: 1930,1931,1959
      asbestos bodies: 2541,2543,2544
    Japan: 1929,1932
      Hiroshima and Nagasaki, smoking: 927,1176
    mineral exposure, review: 2731
    Natal (Africans), smoking: 1065
    nickel exposure, review: 1669
    occupation: 1669,1932
    petroleum asphalt workers, U.S.: 2540
    rare types, children, USSR (Moscow): 2930
    review: 449,2205
    Rumania (Oradea), smoking: 2668
    sex difference: 2670
    silicosis, Switzerland: 2246

EPIDEMIOLOGY (contd.)
    smoking: 32,927,1065,1085,1176,1631,1932,1959,2125,2205,2231,2522,2668,2768
    Tennessee (Memphis), TB and smoking: 2768
    uranium miners: 2521
      Czechoslovakia (Jáchymov), smoking: 2231
      U.S., review: 2495
        smoking, ethnic groups: 2522
    USSR, Leningrad, TB: 1082
      women, smoking: 1631
  lymphoma
    Israel, ethnic groups: 403,1108,2139,2955
    Italy (Turin): 1074
    leper colony (Argentina): 866
  lymphosarcoma of stomach, Finland: 1630
  malignant synovioma, Ceylon (Colombo): 1945
  melanoma
    England (southwestern): 863
    mucosal, head and neck, Finland: 2441
      nasal and paranasal sinus, cases and review: 1940
    prevalence: 2128
      rare sites, review: 2745
  mediastinal tumors, children: 2660
  mouth cancer
    Australia (Victoria), smoking: 1084
    California, smoking: 2672
    Ceylon, betel chewing: 2124
    children, review: 2500
    India, alcohol and tobacco use: 973
    premalignant lesions, Papua/New Guinea; smoking and betel chewing: 397
    review: 2
  multiple primary tumors
    4 sites, case: 2952
    skin cancer, Poland (Gliwice): 1628
  myeloma and related diseases, review: 2200
  nasopharynx cancer
    carcinogen-contaminated foods; India: 959
    Indonesia, ethnic groups, smoking and air pollution: 1068
    Kenya, trace elements in soil: 2927
    Mexico City: 2954
    Nigeria: 1301
  oropharynx cancer, Chile: 1969
  ovary cancer
    California (Oakland): 1089
    Israel, ethnic groups: 861
  pancreas cancer
    Connecticut: 1080
    smoking and diet, Japan: 1636
    USSR (Omsk): 2676
  paratesticular sarcoma, Northern Ireland: 618
  penis cancer
    India: 642,859
    Peru (Cuzco), ethnic groups (Indians): 2688
  pharynx cancer, California, smoking: 2672
  pinealoma and craniopharyngioma, Japan: 1946
  pleural tumors
    effusions, Austria (Vienna): 2933
    mesothelioma, asbestosis, Italy (northern): 2541
  premalignant diseases, Kirghiz SSR, ethnic groups: 2120

EPIDEMIOLOGY (contd.)
  prostate cancer
    Rhodesia (Africans): 1087
    Texas (Houston): 2689
  radiation-induced leukemia, treated breast or uterus cancer: 1699
  renal pelvis and ureter tumors, "Balkan nephritis" areas, Yugoslavia: 1951
  respiratory cancer
    Czechoslovakia: 390
    Illinois (Chicago), air pollution and socioeconomic status: 2932
    New York (Buffalo), air pollution: 2674
    Rumania (urban and rural): 647,648
    San Marino, comparison to Italy: 2654
    U.S., environmental pollution, review: 2734
  salivary gland tumors
    children, Washington (Seattle): 2929
    Iowa: 1939
  screening methods and results: 228,229,392, 394,404,443
  serum antibodies to
    Epstein-Barr virus antibodies, women, Sweden (Eskilstuna): 2852
    SV40, adults and children, Italy, polio vaccination: 1857
  skin cancer
    Canary Islands (Tenerife), climate: 2126
    Florida: 160
    Hong Kong and New Zealand; comparison: 625
    India (Calcutta): 929
    Israel (northern): 1627
    occupational, review: 2731,2732
    petroleum asphalt workers, U.S.: 2540
    Spain, fishermen: 1368
    UV levels in sunlight, Australia: 1703
  small intestine cancer, Great Britain (Birmingham): 611
  solid tumors
    children, methods, Poland: 1285
      southern Italy: 628
  spinal cord tumors
    children, West Germany (Bonn): 2658
    dysembryoplastic, Rumania (Bucharest): 1947
    Mississippi, ethnic groups: 153
  stomach cancer
    ABO blood groups, ABH secretion, review: 2744
      Germany: 2135
    Australia, environmental and socioeconomic factors: 1934
    Bulgaria (Veliko Tirnovo district): 2133
    Czechoslovakia: 2114,2134
    Cuba (Havana), stomach muscle tumors: 2921
    dietary factors, U.S. and Czechoslovakia, comparison: 2922
    East Germany (Leipzig): 385
      ulcer histories: 2769
    England + Wales, socioeconomic and occupational groups: 2440
    Japan: 1078,1932,2673
    Mexico: 610
    New York (Buffalo), air pollution, ethnic groups: 2674
    tumor histology, Mexico City and Colombia: 1933

EPIDEMIOLOGY (contd.)
    Wales, ethnic groups (Welsh and non-Welsh): 2925
    worldwide, male:female ratio: 162
  testis tumors
    Ceylon: 2159
    seminoma, England + Wales, urban-rural difference: 2158
    South Africa (Cape Town), ethnic groups: 1952
  thymus tumors, children: 2661
  thyroid cancer
    goiter region, Madagascar: 1943
    high-goiter (Colombia) or low-goiter area (Connecticut): 1303
    Hiroshima and Nagasaki: 1163
    Michigan (Detroit): 2690
    review: 1694
  upper respiratory tumors
    Cambodia: 862
    plasmacytoma, Scotland (Aberdeen): 148
  ureter cancer, Norway: 1088
  urogenital tumors
    sarcoma frequency, cases and review: 2938
    USSR (Leningrad): 639
  uterus cancer
    Canada: 620
    high- and low-risk groups: 1094
    Italy: 630,1321,2946
    Japan: 1634
    New York City: 1096
    Ohio (Toledo): 1095
  vagina cancer, Czechoslovakia (Brno): 643
EPIDEMIOLOGY, VETERINARY
  all tumors
    dogs, genetic variations: 171,560,561, 646,2160
    pets and their owners,
      California: 1292
        dogs: 1292
      USSR: 2163
    review: 230
    Sprague-Dawley rats: 1961
  bladder cancer
    cattle, Kenya, range plant species: 2161
      review: 2733
  bovine leukosis
    France: 815
    Germany (Saxony): 817
    Great Britain: 608
    human leukemia frequency
      Denmark: 555
      Latvian SSR: 1958
      Poland, review: 2730
    Poland, soil pH and magnesium, review: 2730
    prevention, methods: 810
    Sweden: 554
      Åland Islands, babesiosis vaccination: 816
    transmission, inbred herds, U.S.: 809, 813,814
    Yugoslavia: 811
  endocrine tumors, cattle, sheep and swine, Britain: 1070
  female genital tumors, cattle, sheep and swine, Britain: 1960

EPIDEMIOLOGY, VETERINARY (contd.)
  leukosis-lymphoma
    cattle, sheep and swine, Britain: 406
    dogs, France (Paris): 561
      Pennsylvania: 560
    genetic variations, dogs: 560,561
    pets and their owners: 163,644,2163
  lymphosarcoma, buffaloes, India: 870
  mastocytoma, genetic variations, dogs: 2160
  myelolipoma of liver, wild Felidae in captivity: 409 409
  nasopharynx tumors, dogs and cats, Germany (Munich): 869
  nervous system tumors, domestic animals, cases and review: 2694
  SV40 antibodies
    African or Asiatic monkeys: 1856
    monkey-to-man transmission, India: 1279
  skin tumors, benign histiocytoma, dogs, California: 1293
    fish, Puget Sound: 402
  stomach tumors, dietary and/or genetic factors, rodent (*Praomys natalensis*): 645
  thymus tumors, cattle, sheep and swine, Britain: 2162
  thyroid tumors, dogs, Pennsylvania, boxers and other breeds: 646
  Yaba poxvirus infection, insect vectors, monkey colony, New York: 2384
EPIDIDYMIS
  sarcoma, induction, animal: 287
EPILEPSY
  Hodgkin's disease complicating anticonvulsant therapy: 1758
EPSTEIN-BARR VIRUS (See under Virus, herpes-type)
ESOPHAGUS NEOPLASMS
  achalasia, review: 2494
  alcohol consumption: 609,960,1067,2132,2926
  environmental and dietary factors: 609,959,1065,1219,1223,1224,1635,2129
  epidemiology
    Curacao: 1223,1224
    East Germany: 2132
    India: 959,2129
    Japan: 1635
    Kazakh SSR: 609
    Kenya (western): 2926
    Korea: 921
    Natal: 1065
    review: 228
    South Africa (Transkei): 1219,1638
    Wales, ethnic groups, sex difference: 2924
    worldwide: 2112
    Zambia: 960
  esophageal diverticuli: 1335
  induction
    double-agent regimen, rat: 2567
    nicotine, sheep: 504
    nitroso compounds, rat: 271,738,751,1411
    radiation, mouse: 932
      species difference, rodent: 933
    "spontaneously" formed nitrosamines in stomach, rat: 2569
  pathology: 1079
  plant remedies, Curacao: 1223,1224
ESOPHAGUS NEOPLASMS (contd.)
  scar tissue: 921,1370,2241
  skin carcinoma of prosthetic skin tube: 415
  smoking: 609,1067,1219,1635,1638,2132
  water pollution, Curacao: 1223
ESTRA-1,3,5(10)-TRIENE
  2- or 3-acetamino-, carcinogenesis, mouse: 85
  2-acetylamino-, carcinogenesis, rat: 86
  3-amino-, carcinogenesis, rat: 86
ESTRA-1,3,5(10)-TRIENOL -17β, 3-AMINO-
  carcinogenesis, mouse or rat: 85
ESTRADIOL (See under Hormones)
ESTROGENS (See under Hormones; see also Diethylstilbestrol and Estrone)
ESTRONE
  mammary tumors, androgen response, rat: 2301
  pituitary tumors, blood supply, rat: 511
ESTRUS CYCLE
  dimethylbenzanthracene skin carcinogenesis, rat: 277
  effect of pituitary graft, agent-positive or agent-free mouse: 179
ETHANE, 1,1-DICHLORO-2-(o-CHLOROPHENYL)-2-(p-CHLOROPHENYL)- (o,p'-DDD)
  effect on liver carcinogenesis, rat: 2280
ETHIODOL
  s.c. sarcoma, host immunity, mouse: 1192
ETHIONINE
  effect on
    m-toluenediamine liver carcinogenesis, rat: 2277
    radiation carcinogenesis, mammary gland, rat: 1705
  hepatoma, rat: 520,750,1426,1769
  incorporation into transfer RNA, rat liver: 2061
ETHNIC GROUPS (See also under Genetics, population)
  all tumors, Israel, children, immigrants: 1286
  bladder cancer, Louisiana (New Orleans): 416
  brain tumors, Israel, immigrants: 1069
  breast cancer
    Hawaii, Japanese: 2687
    USSR: 2119
  cervix cancer
    Africa: 151
    American Indians: 166,1957,2157
    Bulgaria: 633
    India: 634,2156
    New York City: 2112
    USSR: 1622,2119,2120
    Washington (Seattle): 1957
  colon and rectum cancer
    Israel, immigrants: 2138
    Manitoba, immigrants: 1308
  esophagus cancer
    Kazakh SSR: 609
    Wales, sex difference: 2924
  gallbladder cancer, Texas (San Antonio): 2131
  g.i. cancer, USSR: 2119
  Hodgkin's disease, children, U.S.: 2147
  leukemia
    children, Israel: 403
      Ohio (Cleveland): 1294
    Orientals (Hawaii and Asia): 1072

ETHNIC GROUPS (contd.)
  - USSR; Russians and Jews: 1980
- lung cancer
  - American Indians, uranium miners, smoking: 2522
  - Canada (British Columbia), immigrants: 1085
  - Illinois (Chicago), air pollution: 2932
- lymphoma, Israel, immigrants: 403,1108,2139, 2955
- nasopharynx cancer, Indonesia: 1068
- ovary cancer, Israel, immigrants: 861
- penis cancer, Peru (Cuzco), Indians: 2688
- premalignant diseases, Kirghiz SSR: 2120
- prostate cancer, Rhodesia (Africans): 1087
- spinal cord tumors, Mississippi: 153
- stomach cancer
  - New York (Buffalo), Polish immigrants, air pollution: 2674
  - Wales: 2925
- testis tumors, South Africa (Cape Town): 1952

EXOCRINE GLANDS
- Harderian or Zymbal glands, carcinogenesis, urethan, rat: 259

EXTREMITY NEOPLASMS
- superficial, pre-existing lesions, African Negroes (Uganda): 253

EYE
- abnormalities (aniridia), Wilms' tumor: 631,1304,1977,2963

EYE NEOPLASMS
- epidemiology, Japan: 2953
- injuries: 258
- lens, induction, SV40, hamster: 2383
- melanoma, with colon polyposis: 1117
- retinoblastoma, genetics: 632,2704
  - risk of second tumor after radiotherapy: 2009

FATS
- heated, s.c. sarcoma and other tumors, rat: 947

FATTY ACIDS
- and glycerol ethers, metabolism, transplantable rat and mouse tumors: 421
- linolenic, UV-irradiated, effect on dimethylaminoazobenzene carcinogenesis, rat liver: 2054

FATTY ACIDS, CYCLOPROPENOID
- cocarcinogenesis, liver, trout: 1226,1227

FLAVONE DERIVATIVES
- effect on
  - benzpyrene hydroxylase induction, rat liver and lung: 266
  - dimethylbenzanthracene carcinogenesis, mouse or rat: 1453

FLUORANTHENE
- analysis, rubber dust: 57

FLUORENE DERIVATIVES
- liver carcinogenesis, mechanism, review: 224
- possible fluorenylacetamide metabolites, antitumor effects (mouse): 699
  - synthesis: 699,700

FLUORENE, 2-AMINO-N-HYDROXY-
- metabolism, guinea pig: 43

FLUORENE, 2-AMINO-N-NITROSO-
- metabolism, guinea pig: 43

2,7-FLUORENEDIAMINE
- mammary tumors, rat: 267

N-2-FLUORENYLACETAMIDE
- biliary tumors, effect of methylcholanthrene, hamster: 303
- bladder and liver tumors, strain and sex difference, mouse: 2255
- effect on liver enzymes, rat: 1738,2056, 2058,2796
- liver tumors
  - hamster: 305
  - rat: 33,86,514,745,754,756,1244,1426, 1482,1738
  - trout: 1227
- mammary tumors, rat: 514
- mechanism of action, nucleic acid binding: 1402,2271
- metabolism, effect of acetanilide, rat: 744,745
- polyoma virus, liver, kidney and s.c. tumors, rat: 2309
- salivary gland tumors, rat: 514
- thyroid tumors, effect of methylthiouracil, rat: 488

N-2-FLUORENYLACETAMIDE, N-ACETOXY-
- possible metabolites, synthesis and antitumor effect (mouse): 699

N-2-FLUORENYLACETAMIDE, N-HYDROXY-
- binding, mechanism, rat liver: 1481,1483, 1484,1485,1486,2063,2271
- distribution, serum proteins, rat: 939
- liver tumors, effect of pituitary hormones, rat: 1748,2801
  - species differences: 755
- metabolism, rat liver: 1764,1765,2561
- possible metabolites, synthesis: 700

N-2-FLUORENYLACETAMIDE, N-HYDROXY-, GLUCURONIDE
- metabolism, rat: 2064

N-2-FLUORENYLDIACETAMIDE
- liver tumors
  - hamster: 305
  - hormone effects, rat: 1235,1775

N,N'-(FLUOREN-2,7-YLENE)BISACETYLAMINE
- liver tumor, tumor induction by RNA extract, mouse: 2067

FLUORIDE
- trace levels, spontaneous tumor incidence, animal: 2291

FLUOROCARBONS
- lung tumors, rat: 492

FOODS (See also under Dietary factors)
- aflatoxin: 1417,1461,1796,2677,2792,2793
  - hepatoma, Uganda (West Nile district): 2677
- animal feeds, toxic fungi: 1229
- carcinogen content, review: 1143,1144,2000, 2736
- contamination, carcinogens from poppy-fumaria plants, esophagus and nasopharynx
  - cancer, India: 959
  - lung and g.i. cancer, U.S., review: 2734
- cows' milk ^{90}Sr levels: 697
- fermented (Japanese), mycotoxin production: 1230

FOODS (contd.)
- nitrosamines, analysis, method: 1418
- plant oils, analysis, polycyclic aromatic hydrocarbons: 329,330
- sausage, hydrocarbon content, effect of cooking methods: 331
- toxic and carcinogenic mycotoxins, review: 2000,2208
- trace elements, cancer incidence: 218,2118
  - nasopharynx cancer, Kenya: 2927

FOOD ADDITIVES
- carcinogenic, review: 680
- Ponceau MX (food coloring), hepatoma, mouse: 2802

FREE RADICALS
- analysis, tobacco smoke: 77
- from benzpyrene *in vitro*, cell-free system: 705

FUNGAL INFECTIONS
- chromoblastomycosis, malignant transformation: 881

FUNGI AND FUNGAL EXTRACTS
- hepatotoxicity and hepatocarcinogenesis, animal and human, review: 2000,2208
- human pathogens, s.c. tumors, mouse: 1198
- isolation and estrogenicity, animal: 1183
- mycotoxins, Japanese fermented foods: 1230
- toxicity, bird: 1229
  - mouse or rat: 1184,1229

Fusarium nivale EXTRACT
- toxicity, mouse: 1184

FUSEL OIL
- liver toxicity and stomach tumors, rat: 316
- mutagenesis, mouse and bacteria: 2260

GALLBLADDER NEOPLASMS
- ABO and Rh blood groups, Germany (Berlin): 2675
- biliary calculi: 391
- epidemiology, review: 2218
  - Texas (San Antonio), ethnic groups: 2131
- liver metastases and paraneoplastic lanugo-type hypertrichosis, case and review: 202

GASTROINTESTINAL CARCINOGENESIS
- antitumor agent (procarbazine), rat: 92
- aromatic amines, hamster: 1777
- benzpyrene, mouse: 91,2050
- biphenyl derivative, rat: 950,2048
- bracken fern (*Pteris aquilina*), animal review: 1147
  - rat: 1222
- Curacao folk remedies, mouse: 1224
- cycasin, rat: 94
  - aglycone, hamster: 1784
- diethylnitrosamine, mouse: 1469
- dimethylbenzanthracene, mouse: 318
  - nitrosodiethylamine or fluorenylenebisacetamide, rat: 2567
- elaiomycin, rat: 2052
- fusel oil, rat: 316
- hydroxyaminoquinoline oxide, mouse: 2566
- method, rat: 1750
- methylbutylnitrosamine, rat: 738
- methylcholanthrene, mouse: 1791

GASTROINTESTINAL CARCINOGENESIS (contd.)
- methylnitrosoaniline, esophagus, rat: 1411
- methylnitrosourea, guinea pig: 741
  - rat: 2266
- methylnitrosourethan, guinea pig: 741
- nitrosoaniline derivative, rat: 1749
- nitroquinoline oxide, effect of salivary gland removal, rat: 2568
  - + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
- nitrosamines, mechanism: 2569
- nitrosobutylurea, rat: 2580
- nitrosofluorene, rat: 86
- nitrosoguanidine, rat: 1431
- nitrosoheptamethyleneimine or nitrosooctamethyleneimine, rat: 2250
- nitrosomethylurea, rat: 2049
- nitrososarcosine ethyl ester, liver RNA and enzymes, rat: 751
- nitrosourethan derivatives, rat: 49
- radiation, human: 473

GASTROINTESTINAL DISEASES
- appendicitis, appendectomy, cancer incidence, Israel: 161
- celiac disease, reticulum cell sarcoma of brain: 2464
- hypertrophic gastropathy (Menetrier's disease), malignant transformation: 2968
- intestinal polyposis, malignant transformation: 1117,2512
- peptic ulcer
  - ABO blood type: 2135
  - fetal or cancer antigen: 1116
  - post-gastrectomy cancer of gastric stump: 2240
  - stomach cancer frequency, East Germany (Leipzig): 2769
- Peutz-Jeger syndrome (intestinal polyposis), with cervix cancer, possible radiation carcinogenesis: 2169
- regional enteritis (Crohn's disease), colon or rectum cancer frequency: 2172
- ulcerative colitis, malignant transformation: 1117,1154,2195

GASTROINTESTINAL NEOPLASMS
- adenocarcinoma, carcinoembryonic antigens, human: 427
- "cancer family" syndrome: 910,1323,1976
- CNS metastases, frequency: 2656
- cytodiagnosis, review: 219
- epidemiology
  - California, pets and their owners: 1292
  - Chile: 1969
  - Connecticut: 1080
  - regional variations, USSR: 2119
  - San Marino: 2654
  - Scotland: 1287
  - U.S.: 2923
  - Venezuela: 149
  - worldwide: 2112,2113
- familial, review: 172
- lymphoma frequency, children: 2662
- primary melanoma, pathogenesis, review: 2745

GASTROINTESTINAL TRACT
- bacteria, diet-related carcinogen production, g.i. cancer epidemiology: 2809

GENETICS, ANIMAL
  Aleutian disease of mink, viral lymphoma-like disease: 1801
  bovine leukosis susceptibility, inbred herds: 809,813,814
  carcinogen sensitivity, host strain, mouse: 226,1435,2037,2735
    karyotype, rat: 264
  cellular gene expression, effect of estrogen, chick oviduct: 99
  characteristics of high hepatoma and mammary tumor mouse strain: 174
  dimethylbenzanthracene skin tumors, hairless and/or asebic mice: 2283
  endometrial sarcoma incidence, strain difference, mouse: 2183
  high- and low-mammary cancer mice, hyperplastic mammary nodules: 1616
  histocompatibility, tumor virus resistance, review: 220
  leukemia virus resistance
    chick embryo: 125
  mouse: 574,1019,1020,1025,1601,2396,2596,2612,2825
    review: 900,2735
  mammary tumor virus resistance, mouse: 118,173,838,1053,1837,2612
  neoplasm incidence, dogs, breed differences: 171,560,561,646,2160
  NZB mouse strain, autoimmunity-lymphoma syndrome: 1342,2601,2703
  pituitary graft response, mouse mammary gland: 1548
  Rous sarcoma virus resistance, mechanism, chick embryo cells: 1047
  stomach cancer, rodent (*Praomys natalensis*): 645
  strain difference, fluorenylacetamide bladder or liver tumors, mouse: 2255
  unusual tumors and hyperplastic lesions, hybrid mouse: 263
  urethan carcinogenesis or teratogenesis, mouse: 1442,1466
GENETICS, CELLULAR
  effect of carcinogens, review: 1666
  hepatoma, mechanism, review: 1155
  origin of tumor antigens, review: 235
  polyoma virus-transformed hamster cells: 996
  latent damage, method of exposure, human cancer cells: 2714
  resistance to avian myeloblastosis virus (BAI strain A): 1820
  SV40-transformed cells: 1584
GENETICS, HUMAN
  albinism, skin cancer: 929
  autosomal anomalies and cancer, cases and review: 2748
  bilateral breast cancer, mother and daughter: 641
  Bloom's syndrome (congenital telangiectatic erythema with growth retardation),
    leukemia or cancer frequency: 2964
  bronchus cancer (brothers; smoking) and genital or breast cancer (sisters): 1343
  "cancer family" syndrome: 910,1323,1976
  cancer incidence

GENETICS, HUMAN (contd)
    offspring of women with breast cancer: 1953
    relatives of children with leukemia: 1979
      women with cervix cancer: 1316
  "cancer-prone" diseases, adenovirus 12 or SV40 transformation of fibroblasts: 1581,1840,1922
    Australia antigen: 2490
  cerebellar medulloblastoma, newborn sisters: 1642
  Chediak-Higashi anomaly, possible virus-induced lymphoma: 1801
  childhood cancer, siblings, U.S.: 152
  colon cancer, siblings and father: 613
  congenital defects, cancer frequency, child: 167
    sarcoma, family cancer history: 1306
  connective tissue tumors, congenital defects, child: 1329
  diffuse interstitial pulmonary fibrosis, lung cancer, brothers: 1641
  epidermodysplasia verruciformis, malignant transformation, possible role of virus: 2965
  familial colon polyposis, g.i. cancer: 661 877,896,2512
  Fanconi's anemia, chromosomal fragility, children: 2981
  Gardner's syndrome (familial soft tissue masses, bony tumors and colon polyposis),
    colon cancer frequency: 2967
  g.i. cancer, review: 172
  glomangioma, father and daughter: 887
  glucose-6-phosphate dehydrogenase deficiency, cancer incidence, Italy (Sardinia): 2167
    cervix cancer, tumor enzymes: 667
  haptoglobin types, female genital cancer, Czechoslovakia (Prague): 2155
  hemangioblastoma (von Hippel-Lindau's syndrome), familial: 1974
  hepatoma, 3 siblings: 183
  hepatorenal glycogen storage disease, hepatoma, brothers: 1328
  hereditary chromaffin differentiation defect with multiple-tumor syndrome: 191,214
  heredity and cancer, review: 467,689,1323,1901,1975,2213,2225
  histocompatibility, tumor virus resistance, review: 220
  Kaposi's sarcoma, father and son: 2720
  kidney cancer, siblings, aged: 407
  larynx cancer, familial: 1975
  leukemia, parents and children, chromosomes: 2962
    twins: 2144,2961
  lymphoma, 3 generations, chromosome markers: 181
  melanoma, siblings: 888,2705
    3 generations: 918
  mongolism and leukemia: 663,1978
  mycosis fungoides, sister and brother: 1326,1327
  neuroblastoma, siblings: 2468
  neurofibromatosis (Von Recklinghausen type), malignant transformation: 1640,2018,2727

- GENETICS, HUMAN (contd)
  - nevoid basal cell carcinoma syndrome: 1324, 1325,2466
  - non-familial aniridia, Wilms' tumor: 631, 1304,1977,2963
  - ovary cancer, mother and daughter: 895
  - Peutz-Jeger syndrome (intestinal polyposis)
    - with cervix cancer, possible radiation
      - carcinogenesis: 2169
  - progressive cerebellar ataxia (Louis-Bar syndrome) and acute leukemia, siblings,
    - family cancer history: 2960
  - retinoblastoma, transmission: 632,2704
  - skin cancer and chronic leukemia, brothers: 1126
  - stomach cancer, familial, Japan: 1078
  - tuberous sclerosis, angiomyolipoma of kidney: 430
  - xeroderma pigmentosum, malignant transformation, sun exposure: 1369,2173,2516
- GENETICS, MICROBIAL
  - adenovirus 2-infected and transformed cells: 2884
  - adenovirus -12 mutants, properties: 1839,2837
  - cancervirus (papovavirus) and SV40, transformed cells: 2842,2843
  - genome complementation, SV40 PARA-adenovirus hybrids: 2858
  - polyoma virus temperature-sensitive mutants, classification: 2846,2847
    - transformed or productively infected cells: 2380
  - SV40 genome, hamster tumor induction, review: 685
- GENETICS, POPULATION
  - esophagus cancer, Wales, sex difference: 2924
  - mathematical model: 1962
  - stomach cancer, Wales: 2925
  - susceptibility to environmental pollution, U.S., review: 2734
- GENITAL NEOPLASMS
  - frequency, aged, Italy (Sulmona): 2655
  - gonadal tumors, XO/XY sex chromosome mosaicism, review: 2509
  - gonadoblastoma, epidemiology, congenital defects, child: 167
- GENITAL NEOPLASMS, FEMALE
  - chromosomes, review: 2508
  - CNS metastases, frequency: 2656
  - contraceptives, review: 2505,2506
  - cytodiagnosis, review: 219
  - diabetes mellitus: 613,1313
  - epidemiology
    - Africa, regional differences: 151
    - Argentina (Buenos Aires), blood groups: 2939
    - Czechoslovakia (Prague), ABO blood groups
      - and ABH secretion: 2940
      - haptoglobin types: 2155
    - Germany: 1091
      - blood groups: 411
    - Iceland: 2942
    - San Marino: 2654
    - U.S., marital status: 2154
    - veterinary (cattle, sheep, swine), Great
      - Britain: 1960
- GENITAL NEOPLASMS, FEMALE (contd)
    - worldwide: 2113
  - Fallopian tube, tuberculous salpingitis: 1644
  - familial (brothers with bronchus cancer, sister with breast cancer): 1343
  - induction, 3,2'-dimethyl-4-aminobiphenyl, rat: 765
  - multifocal, method of spread: 2168
  - primary melanoma, pathogenesis, review: 2745
  - radiation induction, effect of dietary factors, mouse: 2012
  - sex chromatin: 429,662,2718
  - tumor cell "antigen-shielding" substance: 2969
- GENITAL NEOPLASMS, MALE
  - cancer of scrotum, mineral oil exposure, lathe operators: 508
  - sarcoma frequency, cases and review: 2938
- GERMANIUM
  - trace levels, spontaneous tumor incidence, animal: 2291
- GOLD
  - jewelry, radon-contaminated, skin carcinoma, human: 23
- GOSSYPOL
  - cocarcinogenesis, liver, trout: 1226
- GRISEOFULVIN
  - effect on croton oil cocarcinogenesis, mouse skin: 1193
- GUVACINE (See under Betel nut)

- HALLUCINOGENS
  - addiction, multiple (LSD, mescaline, marihuana), acute leukemia: 525
  - LSD
    - binding to DNA, cell-free system: 704
    - effect on
      - chromosomes, mammalian (hamster or human) or plant cells: 2532
      - meiosis, mouse germ cells: 2776
    - mutagenesis, fungi: 2531
    - prenatal exposure, chromosome abnormalities: 1719
    - toxicity, human, review: 2207
- HEAD AND NECK NEOPLASMS
  - benign or malignant, children, Poland (Gdańsk): 2951
  - ear/nose/throat
    - epidemiology, children, Germany: 410
    - occupational, review: 1135
    - smoking, alcohol consumption and occupation, Hungary: 1937
  - epidemiology
    - California, pets and their owners: 1292
    - England, liposarcoma: 1941
    - Germany (Freiburg), children: 2659
    - Japan (Toyama Prefecture): 1938
    - Mexico City: 2954
    - mucosal melanoma: 1940,2441
  - pre-existing diseases, African Negroes (Uganda): 253
  - smoking, Japan: 1936
  - sphenoid sinus carcinoma, radiation induction: 24

HEART DISEASES
- myocardial infarct, cancer incidence: 1290

HEART NEOPLASMS
- metastatic, epidemiology, Norway (Bergen): 868
  - incidence: 1299
- urethan induction, rat: 259

HEMATOPOIESIS
- erythropoiesis
  - kinetics, rat: 1320
  - leukemia virus-infected mouse: 781,1038,1254,1255,1598,2074,2629
- medullary and extramedullary, kinetics, chronic myeloid leukemia: 2958
- platelets, effect of Rauscher leukemia virus, mouse: 1256

HERBICIDES
- toxicity, animal: 764

HERNIA, INGUINAL
- colon cancer: 154

HETEROCYCLIC COMPOUNDS
- mammary tumors, rat: 267

HODGKIN'S DISEASE (See under Lymphoma)

HORMONES
- adrenal
  - effect on SV40 transformation, normal cells: 345
  - liver enzyme induction, effect of thalidomide, rat: 527
  - metabolism, breast cancer: 1119
  - tumor stimulation, animal: 762,2051,2581
- anabolic, plasmacytoma: 1757
- androgen
  - effect on
    - dimethylbenzanthracene adrenal toxicity, rat: 298
    - hydroxyfluorenylacetamide metabolism, rat: 1764
    - induced bladder or liver tumors, mouse: 2066,2255
      - mammary tumors, mouse or rat: 276,1434,1780,2068,2301,2574
    - methylcholanthrene cervix and uterus cancer, mouse: 1753
      - prostate tumors, rat: 766
    - ovarian carcinogenesis, rat: 1434
    - prostate, rat: 435
  - metabolism
    - normal or tumor (adenovirus-induced) cell lines, hamster: 1005
    - spontaneous or cadmium-induced testis tumors, rat: 59,955
  - tumor stimulation, rat: 762
- contraceptive
  - breast cancer, human: 1437,1662
  - cervix cancer or premalignant lesions: 1662,1754,2026
    - review: 2505,2506
  - cervix tumor, mouse: 1490
  - effect on radiation-induced ovary tumor, rat: 1756
    - tumor incidence, hybrid mouse: 263
- dependence
  - induced animal tumors, review: 225
    - mammary tumors, rat: 2302
  - multiple primary tumors, case: 2952

HORMONES (contd.)
- dependence
  - sex chromatin, breast cancer: 1345
  - virus carcinogenesis, review: 231
- effect on
  - avian sarcoma virus sensitivity, monkey: 1871
  - cervix and vagina, mouse, review: 1150
  - chemical, radiation or viral carcinogenesis, mouse, review: 1695
  - DNA, hyperplastic mammary nodule, mouse: 1617
  - experimental tumors: 761
  - fluorenyldiacetamide hepatoma, rat: 1775
  - premalignant dimethylbenzanthracene mammary tumors, rat: 1487
  - virus-producing mouse mammary tumor *in vitro*: 2083
- interaction with liver carcinogens, rat, review: 1665
- estradiol
  - leukemogenesis, mechanism, mouse: 1440
  - lymphoma, polyoma virus sensitivity, mouse: 1568
- estrogen
  - binding, effect of methylcholanthrene, rat uterus: 1752
  - breast cancer promotion, human: 515
  - effect on
    - bladder tumors, mouse: 2255
    - dimethylbenzanthracene adrenal toxicity, rat: 298
    - genetic transcription and translation: 99,674
    - hydroxyfluorenylacetamide metabolism, rat: 1764
    - induced cervical dysplasia or cervicitis, hamster or monkey: 952,2576
    - kidney tumor, hamster: 431
    - liver tumors, mouse or rat: 516,2066,2255
    - mammary tumors, rat or mouse: 47,54,276,279,1139,1188,1770,1780,2068,2591
    - methylcholanthrene-induced genital tumors, mouse or rat: 766,1753,2575
    - uterus, comparison to methylcholanthrene, mouse: 2025
  - fungal, isolation and biological activities: 1183
  - metabolism, breast cancer risk, review: 2215
    - prostate cancer, Africa: 1087
    - normal or tumor (adenovirus-induced) cell lines, hamster: 1005
    - spontaneous testis tumors, rat: 955
  - stimulation of brain tumor, adolescent girl: 1701
  - tumor stimulation, rat: 762
- insulin, effect on DNA, mouse mammary tumor: 54
- leukemogenesis, review: 242
- metabolism, breast cancer: 677,860,885,1971,2150,2443
  - cervix cancer: 860,1634
  - endometrial tumors, mouse: 2183
    - review: 2504

HORMONES (contd.)
    estrogen-induced pituitary tumors, rat: 2303
    plasma cell tumors, review: 1352
    methylcholanthrene-induced ovary tumors, pregnancy and lactation, rabbit: 2577
  neuroendocrine factors, human cancer, review: 1660
  pituitary
    ACTH + somatotropin, adrenal tumors, oophorectomized rat: 1414
    dependence, spontaneous testis tumors, rat: 955
    effect on
      hydroxyfluorenylacetamide liver carcinogenesis, rat: 1748
      mammary tumors, mouse: 179,283,1902, 2363,2590
    mammotropic pituitary tumor, effect on hydroxyfluorenylacetamide liver tumor, rat: 2801
    metabolism, mammary tumors, rat: 50,1436
    possible carcinogenesis, human: 334
    prolactin, metabolism, effect of dimethylbenzanthracene, rat: 767
      and somatotropin, rat with induced mammary tumors: 1436
    somatotropin, effect on fluorenyldiacetamide liver carcinogenesis, rat: 1235
  pituitary-adrenal and thyroid function, ^{90}Sr carcinogenesis, rat: 2228
  pituitary-hypothalamus axis, hyperfunction, endometrium cancer: 1330
  progestational
    effect on dimethylbenzanthracene mammary carcinogenesis, rat: 279,283
      on methylcholanthrene-induced female genital tumors, mouse: 2575
    norethynodrel, mammary tumors, mouse: 2814
  progesterone-corticosteroid conversion, effect of dimethylbenzanthracene, rat adrenal: 2779
  steroid
    analysis, dimethylbenzanthracene-induced mammary tumors, rat: 2572
    C18 and C19, excretion, breast cancer, review: 2149
    C21, effect on dimethylaminoazobenzene liver tumors, rat: 2280
    skin and s.c. tumors, mouse: 1449
    vaginal tumors, mouse, review: 1361
  thyrocalcitonin and prostaglandin, SV40-transformed human thyroid cancer culture: 2378
  thyroid
    biliary excretion, benzpyrene effect, rat: 39
    thyroxine, effect on methylcholanthrene mammary tumors, rat: 262
HYDRAZINE SULFATE (isoniazid metabolite)
  lung tumors, mouse: 493,2046
    rat: 492
    virus particles, mouse: 493
  toxicity, liver, rat: 983
HYDROCARBONS, ALIPHATIC
  Pristane (2,6,10,14-tetramethylpentadecane), plasma cell tumors, mouse: 2297
HYDROCARBONS, POLYCYCLIC AROMATIC
  analysis
    gas chromatography, methods and results, review: 2738
    plant oils: 320,330
    sausage, effect of cooking methods: 331
  biosynthesis, fresh-water algae: 323,940
    skin saprophytes *in vitro*: 324
  effect on
    benzpyrene hydroxylation, mouse liver microsomes: 2272
    tracheal ultrastructure, rat: 268
  embryotoxic and teratogenic effects, rat: 288
  formation from endogenous cholesterol: 2770
  reactions with DNA and protein: 1182,1430
  structure-activity relationships, review: 2742
  transformation, of prostate cultures, and skin tumor-initiating activity, mouse: 2811
    tissue culture: 2034
  zoxazolamine hydrolase induction, rat: 2053
HYDROXYLAMINE, N-ACETYL-N-(3-ESTRA-1,3,5(10)-TRIENYL)-
  carcinogenesis, rat: 86
HYDROXYLAMINE DERIVATIVES
  sarcoma, structure-activity relationships, rat: 1472
HYPOTHALAMUS
  mediation of tumor growth, rat: 666

IMMUNITY
  adenovirus
    human and primate: 594
    induced tumors, hamster: 350,835,836, 1006,1050,1553,1559,1560,1562,1573, 1904,1915,2370,2637,2913
      rat or mouse: 1001,1050,2088,2913
    properties of viral and virus-specific antigens: 353,2838,2892
  avian leukosis-sarcoma viruses
    birds: 364,380,581,800,1045,1050,1870, 2608,2877
    mammals: 800,1827,2874
    properties of viral antigens: 247,2609, 2820,2864
  bovine papilloma virus, horse with equine sarcoid: 138
  chemically induced tumors
    guinea pig or hamster: 422,423,1465,1792, 2288
    mouse: 311,734,1185,1192,1445,1782,1786, 2282,2294,2295,2296,2312,2397,2463, 2859
    rat: 951,1244,2292,2293,2565
  effect of chemical carcinogens, animal: 278,752,757,758,780,977,979,1415,1422, 1492,2307
  experimental and human tumors, review: 217,220,234,235,236,447,457,538,539,688, 899,900,901,902,903,904,912,1151,1158, 1350,1351,1358,1364,1671,1692,2510
  herpes-type virus
    Epstein-Barr, human leukemia and lymphoma: 2386,2462
      serum antibodies, Sweden, women: 2852

- IMMUNITY (contd.)
    - Marek's disease, chicken: 364
  - heterotransplanted human ovary tumor, hamster: 198
  - human cancer: 427,547,1061,1116,1314,2199,2460,2713,2722,2969,2971
  - Ib leukemia, mouse: 2076
  - leukemia and related diseases, human: 405,433,549,889,1262,1803,2199,2386,2460,2462,2490,2723,2724
  - mammary tumor virus, mouse: 134,839,840,1053,1278,1546,1547,2361,2362,2364
  - polyoma virus-induced tumors, animal: 829,1827,2095,2620,2621,2848
  - radiation-induced leukemia, rat: 1383
  - RNA viruses (avian or mouse), viral and virus-induced antigens: 2864
  - sarcoma virus tumors, mouse: 128,1039,1041,1822,1885,2350,2575,2866,2867
  - serum SV40 antibodies
    - human cancer, India: 1279
    - primates and man: 594
  - Shope virus papilloma, animal: 2097,2098
  - strain-specific or -nonspecific tumor, mouse: 2463
  - surface antigens, virus-transformed cells: 2373,2394,2426,2429,2430,2434,2627
  - SV40
    - induced hamster tumors: 1282,1562,1573,2091,2844,2845
    - transformed or infected cells: 998,1283,1619,1910,2372,2648,2888,2891
  - tissue and serum antigen complexes, benzidine-treated rat: 2535
  - tolerance induction by ascites, animal and human: 212
  - transplanted tumors, mouse: 197,1445,2076
  - tumor-specific antigens, antibody determination: 360
    - spontaneous mouse mammary tumor: 2611
  - viral leukemia or lymphoma
    - mouse: 105,106,108,123,369,574,575,576,597,600,779,780,782,844,845,852,1018 1019,1020,1026,1028,1029,1030,1512,1514,1515,1673,2072,2078,2339,2397,2592,2627,2712,2826,2828,2865
    - rat: 1596,1597,1608
  - virus-induced tumors, mouse: 853
  - Yaba poxvirus, monkey: 1064,1507
- IMMUNITY DISORDERS
  - autoimmunity
    - dimethylbenzanthracene leukemia, rat: 1759
    - pathogenesis of lymphoma, NZB mouse: 1129,1342,2601,2743
    - possible precursor of malignant tumors, review: 2740
    - Sjögren's syndrome and autoimmune hemolytic anemia, with chronic leukemia: 2721
  - collagen diseases, cancer pathogenesis, human: 2226,2470
  - congenital or hereditary, cancer incidence, child: 167
  - dermatomyositis, cervix cancer: 2471
  - discoid lupus erythematosus, skin cancer: 2469
  - hay fever-type allergy or pregnancy sickness, negative association with cancer: 2461
- IMMUNITY DISORDERS (contd.)
  - IgA deficiency, with rejected kidney graft and Kaposi's sarcoma: 1646
  - inflammation and fibrosis, "solid-state" carcinogenesis, human, review: 1140
  - lymphoma incidence, aged *Mastomys natalensis*: 1291
  - lupus vulgaris, spindle cell sarcoma of lupus scar: 2526
  - myeloma and related diseases: 557,2200,2706
  - myelomonocytic leukemia, chromosome abnormalities: 211
  - polyoma virus-induced runting, effect of antilymphocyte serum, mouse: 2428
  - rheumatoid arthritis, leukemia incidence: 2141
    - leukemic transformation, mechanism: 1336
  - scleroderma, lung cancer: 395,2194
  - systemic lupus erythematosus, with leukemia or lymphoma: 883
  - tonsillectomy and leukemia, twins: 1981
- IMMUNOSUPPRESSION
  - antiserum
    - effect on polyoma virus sensitivity, mouse: 2094,2428
      - virus-induced leukemia or sarcoma, mouse: 1522,2350,2823
  - dimethylbenzanthracene, mouse: 2041
  - effect on Marek's disease, chicken: 818
  - Friend leukemia virus, mouse: 2599
  - immunochemotherapy, viral lymphoma, mouse: 2078
  - kidney transplant, complications, lymphoma or Kaposi's sarcoma, possible virus activation, human: 1646,1800
  - mammary tumor virus immunization, mouse: 2362
  - mineral oil plasma cell tumors, mouse: 2314
  - Rauscher leukemia virus, mouse: 2404,2600,2828
  - Rous virus tumors, baboon: 2878
  - urethan, relationship to leukemogenesis, mouse: 2306
- INJURIES (See also under Scar tissue)
  - bone, osteoma, review: 2728
  - burns
    - effect on nuclear DNA, mouse skin: 1730
    - methylcholanthrene skin tumors, mouse: 1169
    - skin cancer, human: 253,919,929,2003,2016,2204
  - chemical
    - effect on nuclear DNA, mouse skin: 1730
    - esophagus cancer, human: 921,1370,2241
    - skin cancer, human: 919,2765
  - chronic irritation, mouth cancer: 2,2015
  - cranial, brain tumors, human: 15
  - electrical or surgical, skin sarcoma: 1306
  - esophagus, achalasia, cancer frequency, review: 2494
  - eye tumors: 258
  - hemorrhagic shock, effect on metastasis formation, rat: 2198
  - joints, chondrosarcoma, knee: 1177
    - fibrous xanthoma of synovium: 1944
  - larynx, larynx cancer, human: 1712,1972
  - lung, lung cancer, review: 683
  - mechanical, melanoma, human: 918,2242,2705

INJURIES (contd.)
        skin cancer, human: 919,920,929,2765
    occupational, skin cancer, review: 2732
    respiratory epithelium, squamous metaplasia, singers or wind instrument players: 2238
    soft tissues, tumor metastases to traumatized tissue, lung or breast cancer: 2766
    stress, effect on spontaneous leukemia or methylcholanthrene carcinogenesis, mouse: 694
    unhealed varicose ulcer, "collision tumor" (skin and periosteum): 2004
INTERFERON
    effect on
        human adenoviruses, tissue culture: 2087
        mouse leukemia or sarcoma virus-infected normal cells: 1510,1825,2351
        spontaneous leukemia, mouse: 1250
        virus-induced leukemia, mouse: 370,596, 1036,1250,2339
    induction
        Statolon, effect on Friend leukemia virus infection, mouse: 1878,2399
        synthetic RNA polymer, effect on viral sarcoma or leukemia, mouse: 1037,2410
    polyoma virus induction, normal cells: 1572
    production, effect of SV40 or carcinogen transformation, rat embryo cells: 2616
    Rous sarcoma virus induction, chick embryo cells: 1538,1539
INTESTINAL NEOPLASMS
    induction
        antitumor agent (procarbazine), rat: 92
        biphenyl derivative, rat: 950
        cycasin, rat: 94
        2-nitrosofluorene, rat: 86
        nitrosourethan derivatives, rat: 49
INTESTINE, LARGE, NEOPLASMS
    adenomatous polyposis, malignant transformation: 1117
    dietary factors
        carcinogen production by intestinal bacteria, England and Uganda: 2809
        U.S. and Czechsolovakia: 2922
    epidemiology, U.S., marital status (nuns): 2154
    induction, dimethylaminodiphenyl, effect of laxative, rat: 2048
INTESTINE, SMALL
    regional enteritis, malignant transformation: 878
INTESTINE, SMALL, NEOPLASMS
    epidemiology and classification, Great Britain (Birmingham): 611
    ileum, with sarcoidosis and ulcerative colitis: 2195
    induction, dimethylaminodiphenyl, effect of laxative, rat: 2048
    lymphoma, malabsorption syndrome: 1973
    regional enteritis: 878
    second primary tumor incidence: 1289
IODIDES
    analysis, human tumors: 2970
IRON
    analysis, human tumors: 2970
    metabolism disorder (hemochromatosis), with hepatoma: 2481
    occupational exposure, lung cancer, review: 2731
    soil, nasopharynx cancer, Kenya: 2927
IRON-CARBOHYDRATE COMPLEX
    lymphoma, mouse or rat: 332
IRON OXIDES
    possible cocarcinogenesis with asbestos (occupational exposure): 1202
ISONIAZID (See Isonicotinic acid hydrazide)
ISONICOTINIC ACID HYDRAZIDE
    absence of carcinogenic effect, hamster: 2047
    liver tumors, mouse or rat: 294
    lung and kidney tumors, rat: 492
    lupus vulgaris, cancer incidence: 1724
    metabolite, liver tumors, mouse or rat: 294
        lung tumors, mouse: 2046
    negative results, children: 958
    possible lung carcinogenesis, TB, smoking: 2768
ISOTHIOCYANATE, α-NAPHTHYL-
    effect on m-toluenediamine liver carcinogenesis, rat: 2277
    hepatoma, enzymes, rat: 2182

JAW NEOPLASMS
    epidemiology, Nigeria, oral hygiene: 1942
    from odontogenic cyst, review: 1998
JOINT DISEASES
    degenerative, fibrous xanthoma of synovium: 1944
    hypertrophic pulmonary osteoarthropathy, bronchial cancer: 1331
    leukemia incidence, rheumatoid arthritis and related diseases: 2141

KIDNEY
    benzidine distribution, rat: 319
    graft, complications of rejection, Kaposi's sarcoma: 1646
    Gross viral leukemia, pathology, mouse: 1816
    interstitial cells, growth and development, rat: 957
    nucleic acids, effect of carcinogens, rat: 1410
KIDNEY CARCINOGENESIS
    aflatoxin, rat: 2808
    antitumor agent (procarbazine), rat: 92
    cycasin, rat: 93,94,282,957
    diethylnitrosamine
        pregnant and fetal rodent, review: 911
        swine: 2275
        tumor ultrastructure, rat: 2554
    dimethylnitrosamine, rat: 88,768,2252
    elaiomycin, rat: 2052
    fluorenylacetamide + polyoma virus, rat: 2309
    formamide derivative, rat: 1471
    isoniazid, rat: 492
    lead acetate, enzyme metabolism, rat: 769

- KIDNEY CARCINOGENESIS (contd.)
  - methylcholanthrene, monkey: 1416
  - nitrosomethylurea, rat: 321,2049
  - nitrosomorpholine, premalignant glycogen storage disease, rat: 275
  - phenacetin addiction, human: 1751
  - polyoma virus, sarcoma, rat: 2382
  - radiation, effect of radioprotective agent, rat: 2759
  - thiazole derivatives, rat: 1470
  - urethan, rat: 259
  - *Zamia debilis* leaves and cycad nuts, rat: 282
- KIDNEY DISEASES
  - "Balkan nephritis," kidney or ureter cancer, Yugoslavia: 1951
  - Type I glycogen storage disease, with hepatoma, brothers: 1328
- KIDNEY NEOPLASMS
  - angiomyolipoma (hamartoma), hereditary tuberculous sclerosis, human: 430
  - enzymes, rat: 2711
  - epidemiology
    - adolescence: 2665
    - "Balkan nephritis" areas, Yugoslavia: 1951
    - Venezuela: 387
  - estrogen sensitivity, hamster: 431
  - Lucké adenocarcinoma (frog)
    - seasonal variation of virus content: 2111
    - ultrastructure: 991
  - mixed carcinoma, histogenesis: 207
  - renal cell carcinoma, aged siblings: 407
  - sarcoma frequency, cases and review: 2938
  - smoking and urbanization, U.S.: 975
  - spontaneous, virus isolation, frog: 590
  - Wilms' tumor (nephroblastoma)
    - antigenic differentiation, child: 2713
    - bilateral, child: 441
    - epidemiology, congenital defects, child: 167
    - non-familial aniridia, child: 631,1304, 1977,2963
    - papovavirus-like particles, child: 1906
    - ultrastructure and histogenesis, child: 656
- KYNURENINE DERIVATIVES (tryptophan metabolites)
  - bladder tumors, mouse: 2550
- KYNURENINE, 3-HYDROXY- (tryptophan metabolite)
  - leukemia and solid tumors, mouse: 87
  - mutagenesis, human embryo cells: 2035,2529
  - urine, effect of ascorbic acid, bladder cancer and smokers: 2549

- LACTATION (See also under Mammary gland and Pregnancy)
  - effect on
    - hormonally active induced ovary tumors, rabbit: 2577
    - mammary tumors, mouse: 382
  - leukemia virus transmission, mouse: 1028, 1029,1030,2337,2338
- γ-LACTONES
  - prediction of carcinogenic effect, method: 941
- LARYNX NEOPLASMS
  - carcinoma, after radiotherapy of larynx sarcoma: 2232
- LARYNX NEOPLASMS (contd.)
  - cell growth kinetics: 2698
  - epidemiology
    - children and adolescents, case and review: 2130
    - Connecticut, smoking: 1081
    - Hungary, alcohol consumption and occupation: 1337
      - smoking: 635,1337
    - India (Assam): 2928
    - Japan, smoking: 1936
    - Poland (Cracow), smoking: 971
    - sex difference, Czechoslovakia (Prague): 384
  - familial (siblings, cousins, father and son), smoking: 1975
  - possible complication of interstitial cell pneumonia, smoking: 190
  - predisposing causes, USSR: 1972
  - prognosis, TB, Italy: 1970
  - radiation-induced, papillomatosis of larynx, child: 1166,1972,2709,2763
  - scar tissue, human: 1712,1972
- LASIOCARPINE
  - effect on nucleus and nucleolus, rat liver: 521,1741
  - induction of helical polysomes, rat liver: 2563
  - liver toxicity, effect of dietary lipotropes, pregnant and fetal rat: 1233
  - mechanism of action, rat liver mitochondria: 1747
- LAXATIVES
  - magnesium sulfate, effect on dimethylaminodiphenyl carcinogenesis, g.i. tract, rat: 2048
- LEAD
  - soil, nasopharynx cancer, Kenya: 2927
  - trace levels, spontaneous incidence, animal: 2291
- LEAD ACETATE
  - kidney tumors, enzyme metabolism, rat: 769
- LEAD COMPOUNDS
  - automobile exhaust, air transport: 1463
- LEPROSY
  - cancer risk, U.S.: 1107
  - lymphoma incidence, Argentina: 866
- LEUKEMIA, EXPERIMENTAL (See also under Virus, leukemia/lymphoma)
  - AK (mouse), liver catalase and RES function: 853
  - AKR (spontaneous or viral), interferon effects, mouse: 1250
  - BW5147 (mouse), thymic glycolysis: 892
  - cell lines, stimulation of normal or tumor cells, mouse: 2582
  - EARAD-1 radiation-induced (mouse), effect of enzyme + virus: 1649
  - epidemiology, pets and their owners: 644,2163
  - feline, virus isolation: 562,563
  - Friend virus (mouse), effect of thiamine deprivation: 367
  - genetic susceptibility, herpes-type virus, guinea pig: 2635
  - growth kinetics, mouse: 2452
  - hamster, virus, properties: 2879

LEUKEMIA, EXPERIMENTAL (contd)
- heterotransplanted or radiation-induced, chromosomes, mouse: 2191
- historical review: 237
- human leukemia virus, mouse: 556
- L2C/NB (guinea pig), effect of ACTH, dimethyl sulfoxide or dexamethasone: 2581
  - herpes-like virus: 2436
- L-1210 (mouse)
  - cell generation time: 371
  - effect on erythropoiesis: 2074
- line I_b, immunity, mouse strains: 2076
- monkey, attempted virus isolation: 1508
- mouse, review: 238,239
- radiation-induced
  - chloroleukemia, age, strain and radiation effects, rat: 1383
  - pathogenesis, mouse: 1167
- Rauscher (mouse), chemotherapy: 1918
- spontaneous
  - cats and dogs, review: 243
  - dog, transmission: 2398,2405
  - effect of stress, mouse: 694
  - incidence, effect of methylcholanthrene or radiation, rat: 2308
  - mast cell, transmission, dog: 793
  - monocytic, dog: 790
  - myeloid or lymphatic, serum proteins, dog: 791
- virus-induced, enhancement by arbovirus, mouse: 572
  - immunology, mouse: 575

LEUKEMIA, HUMAN
- acute lymphatic
  - mitochondrial tetracycline fluorescence: 2475
  - progressive cerebellar ataxia (Louis-Bar syndrome), siblings, family cancer history: 2960
- acute myeloid
  - cell line (LI-1), morphology and immunoglobulins: 1056
  - Ph^1-positive, drug addict (LSD, mescaline, marihuana and barbiturates): 525
- Australia antigen: 1671,2490
- avian leukosis/sarcoma virus antibodies: 1262
- benzene-induced, pseudo-Pelger anomaly: 489
- bone marrow *Mycoplasma*: 1804
  - RNA, effect on normal cells: 553
- cell growth kinetics: 1100,1101,1102,1103, 2754,2958
- cell lines
  - chromosomes: 2485
- child
  - cancer incidence in relatives: 1979
  - familial mongolism: 1978
  - high-risk disease (Fanconi's anemia), chromosomal fragility: 2981
  - retarded bone growth: 2482
    - tonsillectomy, twins: 1981
  - viral etiology, India: 157
    - review: 1357
  - xeroderma pigmentosum: 1369
- chromosomes: 184,192,196,204,418,424,525,664, 873,1113,1114,1341,1347,1348,1349,1650, 1980,1982,1983,1984,1985,1986,2174,2190, 2192,2485,2748,2962,2973

LEUKEMIA, HUMAN (contd)
  - review: 455,466,2224,2513
- chronic basophilic, with TB, blood histamine elevation and asthma: 213
- chronic lymphatic
  - autoimmune hemolytic anemia and Sjögren's syndrome: 2721
  - mitochondrial tetracycline fluorescence: 2475
  - phytohemagglutinin transformation, WBC cultures: 2474
  - reticulum cell sarcoma in spouse: 187
  - skin cancer, brothers: 1126
- chronic myeloid
  - acute transformation, chromosomes: 2190
  - chromosomes: 1980,1982,1983,1984,1985,1986
  - identical twins, case (child) and review: 2961
  - mother and son, chromosomes: 2962
  - Ph^1-positive, familial: 2748
  - WBC alkaline phosphatase: 1659,1982,1983, 1984
- collagen diseases, pathogenesis: 2470
- colon polyposis: 1117
- diabetes mellitus: 616
- differential diagnosis (WBC enzymes): 1125
- distribution of hemoglobin types: 2472
- eosinophilic, differential diagnosis: 544
- epidemiology
  - aged, review: 2503
  - children
    - Australia (Brisbane and Sydney), polio vaccination: 1054
    - California: 651,1639
      - mongolism: 663
      - twins: 2144
    - congenital defects: 167
    - India: 2950
    - Israel: 403
    - Michigan, birth order and maternal age: 2142
    - Ohio (Cleveland and suburbs): 1294
    - Poland, methods: 1285
    - radiation exposure, virus disease and/or maternal reproductive history: 864
    - U.S., siblings: 152
  - Denmark: 555
  - Hawaii: 1072
  - Iraq (Baghdad): 1295
  - Italy (Turin): 1073
  - Japan: 865,1950,2145
    - Hiroshima-Nagasaki: 1697,1698
  - Latvian SSR, bovine leukosis areas: 1958
  - leprosy: 1107
  - Minnesota (Olmsted County): 1071
  - New Zealand, siblings and other relatives: 2143
    - time-space distribution: 1632
  - offspring of women with breast cancer: 1953
  - pets and their owners, USSR: 2163
  - Poland, bovine leukosis exposure, review: 678
    - magnesium deficiency (diet and soil), review: 2730
  - Sweden: 554
  - U.S., smoking and urbanization: 975
  - USSR, ethnic groups (Russians and Jews): 1980

EUKEMIA, HUMAN (contd)
    West Germany: 2140
    worldwide, adult: 2112
  erythroleukemia, karyotype: 2174,2192
  erythromyeloid, benzene exposure: 2579
    radiation-induced: 1397
  erythromyelosis (Di Guglielmo type), chromosomes: 2973
  familial congenital telangiectatic erythema and growth retardation (Bloom's syndrome): 2964
  fracture fixation by intramedullary nails: 483
  herpes-type virus: 1055,1058,1260,2100,2103, 2104,2386
  HL-A antigen frequency: 405
  Hodgkin's disease, karyotype: 1650
  immunoglobulin synthesis: 2724
  incidence, rheumatoid arthritis and related diseases: 1336,2141
  leukemia-like patterns of DNA, RNA and protein, WBC, infectious mononucleosis: 2387
  Mycoplasma antibodies: 778
  myelomonocytic, immunity disorder and chromosome abnormality: 211
  parents and children, chromosomes: 2962
  possible transmission from pets: 163,644,2163
  radiation-induced: 1699,1700,2230
    review: 2203
  specific immunity: 2460
  systemic lupus erythematosus: 883
  transmission to mice, properties: 2405
  ultrastructure: 591
    review: 1357,2221
  virus-like particles: 548,552,556,775,1055, 1056,1059,1798,1802,1803,1874,1912,1914,2335
EUKEMOGENESIS, EXPERIMENTAL (See also under radiation leukemogenesis and Virus, leukemia/lymphoma)
  antitumor agent (procarbazine), rat: 92
  avian leukosis virus, effect of host genotype, chick embryo: 125
  benzpyrene, mouse: 954,2050
  chemical
    host genetics, mouse, review: 2735
    tumor-specific antigens, thymic lymphoma, mouse: 2397
  corn oil, lymphosarcoma, mouse: 1788
  dibenzanthracene, hamster: 1439
  dimethylbenzanthracene
    hamster: 1439
    mouse: 48,291,318,954,2037,2042
      fetus: 2263
      mammary tumor virus-infected: 2612
      strain differences: 1725
      virus isolation: 787
    rat: 264,710,1759,1787,2043
      chromosomes: 710,2043
      tumor ultrastructure: 1409
  elaiomycin, thymoma, rat: 2052
  estradiol, mouse: 1440
  estratriene derivatives, mouse: 85
  Gross virus, mammary tumor virus-infected mouse: 2612
  3-hydroxykynurenine, mouse: 87
  6-mercaptopurine, cell-free passage, mouse: 1499

LEUKEMOGENESIS, EXPERIMENTAL (contd)
  methylcholanthrene
    mouse: 307,954,1438,1499
    rat: 264
  methyl methanesulfonate, mouse: 531
  methylnitrosourea
    mouse: 321,1500
    rat: 2266
  methylnitrosourethan, mouse: 2044
  mineral oil plasmacytoma
    mouse: 1441,1767,2314
    role of sex hormones, mouse, review: 1352
  nitrogen mustard N-oxide, mouse: 2044
  nitroquinoline-1-oxide, strain differences, mouse: 2037
  nitrosobutylurea, rat: 2580
  nitrosohexamethyleneimine, rat: 1726
  Pristane (2,6,10,14-tetramethylpentadecane), plasma cell tumors, mouse: 2297
  tobacco tar, mouse: 722
  trimethylbenzanthracene
    karyotype, rat: 1787
    mouse: 954
  tumor cell DNA ± RNA, mouse: 532
  mouse: 1232,1498,2037,2044,2306
    radiation effects: 2518,2519
    review: 2739
    strain differences: 537,2037
    virus-like particles: 787,2305
  viral
    host genetics, mouse review: 2735
    tumor-specific antigens, thymic lymphoma, mouse: 2397
  xanthurenic acid 8-methyl ether, mouse: 1766, 2036
LEUKEMOGENESIS, HUMAN
  anabolic hormone (muscular dystrophy), plasmacytoma: 1757
  anticonvulsants, Hodgkin's disease: 1758
  benzene: 489,2330,2331,2579
  chloramphenicol: 2589
    mechanism, review: 1667
  immunosuppressive therapy (kidney graft), lymphoma: 1646,1800
  phenylbutazone, malignant reticulosis, child: 709
LEUKEMOID REACTION
  to adjuvant, methylcholanthrene-treated mouse: 1415
LEUKOSIS (LEUKEMIA), AVIAN
  erythroleukemia virus-induced, radiation effects, chick: 1171
  control, Hungary: 799
  group-specific antigens, immunized chickens: 2359
  MC29, classification of virus: 1819
  ocular, pathology, virus particles: 1265
  possible vaccine transmission, review: 1657
  review: 245,246,247,248
  viral, chicken origin, tumors in ducklings: 1540
  virus contamination, chick embryo cells: 1534
    multiplication, endocrine organs, chicken: 1263
LEUKOSIS, AVIAN, MAREK TYPE (See under Marek's disease)

- LEUKOSIS (LEUKEMIA), BOVINE
  - cell lines (lymphosarcoma), karyotype and *in vitro* growth: 1014
  - epidemiology
    - Denmark: 555
    - France: 812,815
    - Germany (Saxony): 817
    - Great Britain: 406,608
    - Latvian SSR: 1958
    - Poland, human cancer incidence: 1637
      - magnesium deficiency (diet and soil), review: 2730
    - Sweden: 554,816
    - U.S., genetic susceptibility: 809,813,814
    - Yugoslavia: 811
  - human leukemia, review: 678
  - pathology: 802,842,1268,1269,1271,1272,1273, 1284
  - possible transmission, babesiosis vaccine: 816
  - prevention, methods: 810
  - review: 244
  - serum immunoglobulins: 1270
  - spontaneous lymphosarcoma, DNA-bound amino acids: 2184
  - transmission: 803,804,805,806,807,808,809,811
  - virus isolation and properties: 1266,1267,1274
- LIVER
  - Δ-aminolevulinic acid synthetase, virus-induced polycythemia, mouse: 2597
  - antigens, carcinogen-treated rat: 979,2535
  - benzidine effects, rat: 319,2535
  - carbohydrates, diethylnitrosamine carcinogenesis, rat: 1739
  - carcinogen effects, rat: 981,983,1410,1419, 1423,1424,1429,1480,1481,1483,1484,1485
  - catalase
    - effect of cycasin, rat: 1718
    - leukemia-bearing mouse: 853
    - Mazurenko virus leukemia, mouse: 2602
    - virus leukemia and bacterial infections, mouse: 601
  - cholesterol, effect of carcinogens, rat: 41
  - chromosomes, effect of carcinogenic or non-carcinogenic agents, rat: 95
  - dealkylation of 1-aryl-3,3-dialkyltriazene carcinogens *in vitro*: 2059
  - DNA
    - carcinogen binding, rat: 756,2063
    - effect of dimethylbenzanthracene, mouse: 2310
  - embryonic, effect of dimethylnitrosamine *in vitro*, rat: 980
  - enzymatic detoxication of aromatic amine carcinogens, guinea pig: 44
  - enzyme induction, DMBA or hydrocortisone, effect of thalidomide, rat: 527
  - enzymes
    - bioassay of radiation leukemia-protective factor, mouse: 2517
    - effect of carcinogens, rat: 2029,2053,2055, 2057,2058,2060,2182
  - extract, effect on mammary tumor virus-induced tumors, mouse: 2365
  - genetic transcription, effect of methylcholanthrene, rat: 2797

- LIVER (contd)
  - glycogen
    - carcinogen binding, rat: 756
    - induced hepatoma, rat: 518,519
  - helical polysomes, induction, lasiocarpine or aflatoxin, rat: 2563
  - hydroxyanthranilic acid as hapten, mouse: 977
  - lysosomes, tumor-bearing rat: 2176
  - metabolism
    - azobenzene derivative, rat: 1763
    - dimethylbenzanthracene, age and species differences: 749
    - hydroxyfluorenylacetamide, rat: 1764,1765, 2561
  - microsomes
    - benzpyrene hydroxylase, rat or mouse: 742, 1187,2272,2273,2324
    - carbon monoxide-binding particles, effect of methylcholanthrene, rat: 2316
    - enzymes, effect of methylcholanthrene, rat: 747,748
    - hemoprotein, effect of methylcholanthrene, rat: 2795
    - metabolism of benzanthracene derivatives, effect of methylcholanthrene, rat: 2028
    - methylcholanthrene metabolism, rat: 2318
  - mitochondrial contractility, effect of carcinogens, rat: 2279
  - nuclear histones, premalignant lesions, rat: 317
    - proteins, effect of azo dye carcinogen, rat: 1237,1238
  - nucleic acids and proteins, effect of aflatoxins and nitrosamines, rat: 1742
  - nucleolus, effect of carcinogens, rat: 29,521, 2062
  - proteins
    - azo dye carcinogen binding, mechanism, rat and mouse: 306
    - effect of carcinogens, rat: 522
  - radiation effects, hamster: 1385
  - RNA
    - methylation, effect of diethylnitrosamine, rat: 2562
    - nucleolar, effect of carcinogens, rat: 743
    - polymerase, effect of carcinogen, rat: 1231
    - transcription, effect of methylcholanthrene, rat: 2315
    - transfer ethionine incorporation, rat: 2061
  - RNase and acid phosphatase, effect of fluorenylacetamide, rat: 2796
  - role in dimethylbenzanthracene adrenal necrosis, rat: 1413
  - thyroxine metabolism, effect of benzpyrene, rat: 39
  - toxicity
    - aflatoxin, animal and human, review: 1149
      - chick embryo: 984
      - duckling: 2790
      - enzyme induction, rat: 988
      - monkey: 2269
      - rat: 1745
      - species difference (mouse and rat): 987
      - swine: 1740
    - dimethylnitrosamine, effect of protein-free diet, rat: 2799

IVER (contd.)
      mink: 2798
    carcinogenic or non-carcinogenic chemicals, mechanism, review: 1663
    epoxy resin hardener (diaminodiphenylmethane), animal and human: 314
    fusel oil, mouse and rat: 316
    lasiocarpine, effect of dietary lipotropes, pregnant and fetal rat: 1233
    methyldimethylaminoazobenzene, ultrastructure, rat: 2805
    pyrrolizidine alkaloids, animal and human, review: 1148
      rat: 1747
    thioacetamide, rat: 2800
    tolylazonaphthylamine, mouse or rat: 2794
  tryptophan oxygenase (cortisone-induced), effect of thioacetamide, rat: 2328
  ultrastructure, effect of carcinogens or toxic chemicals, rat: 520,1741,1746
  uridine diphosphate glucuronyltransferase, effect of methylcholanthrene, rat: 2317
IVER CARCINOGENESIS
  acetamide, rat: 46,1744
  acetamidofluorene, hamster: 303,305
  acetylaminofluorene, rat: 33,86,514,754,1426
  aflatoxin
    animal: 1225
    B-1 and B-2, trout: 2270
    rat: 746,2808
    review: 1149,2208,2755
    trout: 517,1226,1227,1421
  aminoazobenzene derivatives, rat: 28,38,64, 96
  aminoazotoluene, schistosomiasis, mouse: 2276
  aminochrysene, mouse: 2254
  aromatic amines, hamster: 1777
  azobenzene derivatives, rat: 497
  azo dye
    food coloring (Ponceau MX), mouse: 2802
    mechanism, review: 224
  biphenyl derivatives, mouse: 295
  carbon tetrachloride + alcoholic cirrhosis, human: 526
  carcinogen toxicity, mechanism, review: 1663
  chemical, tumor ultrastructure, rat: 520
  cirrhosis-inducing diet for carcinogen testing, rat: 1239
  cycad nuts and *Zamia debilis* leaves, rat: 282
  cycasin, rat: 94
    aglycone, hamster: 1784
  cyclic N-nitrosamines, mechanism, rat: 1762
  diacetamidofluorene, hamster: 305
  dibutylnitrosamine, guinea pig: 740
  dichlorodiaminodiphenylmethane, rat: 2251
  diethylnitrosamine
    guinea pig: 422,423,1792
    monkey, properties of cell line: 175
    mouse: 1469
    pregnant and fetal rodent, review: 911
    swine: 2275
    rat: 51,317,752,753,982,1428,1739
  dimethylaminoazobenzene
    mouse: 300
    rat: 28,96,261,497,516,518,519,757,978, 1234,1236,1427,1480,1761,2054,2181,2278, 2280,2564,2803,2804

LIVER CARCINOGENESIS (contd.)
  dimethylbenzanthracene
    + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
    mouse: 295,318,1725, 1736
  dimethylnitrosamine
    mouse: 1425
      sex difference: 2066
    rabbit: 2274
    rat: 976
      sex difference: 1790
    trout: 296
  elaiomycin, rat: 2052
  epoxy resin hardener (diaminodiphenylmethane), rat: 314
  ethionine
    + azobenzene derivative, cytoplasmic fibrils, rat: 1769
    DNA metabolism, rat: 1426
    role of transfer RNA, rat: 750
  fluorenes, mechanism, review: 224
  fluorenylacetamide
    + fatty acids, trout: 1227
    mouse, strain and sex difference: 2255
    polyoma virus, rat: 2309
  fluorenylacetamide, rat: 745,756,1482,1738, 1775
  fluorenyldiacetamide, hormone effects, rat: 1235,1775
  food constituents, review: 1143,1144
  hepatoma or normal liver RNA, mouse: 284
  hormone interactions, rat, review: 1665
  hydroxyfluorenylacetamide
    effect of pituitary hormones, rat: 1748, 2801
    species difference, mechanism: 755
  GA virus (associated with Marek's disease), RNA methylase activity, chick: 2437
  immunology, rat: 1422
  isoniazid and metabolite, mouse or rat: 294
  mathematical model: 2695
  mechanism, review: 446,1356
  methylcholanthrene
    hamster: 303
    premalignant, protein and -SH levels,,rat: 51
  methyldimethylaminoazobenzene
    mouse: 1459,1460
    rat: 64,1426,2182,2189,2565
      properties of mitochondria: 2279,2806
  mycotoxins, animal and human, review: 2208
  β-naphthylamine product (benzoquinoline-69), rat and mouse: 2553
  α-naphthylisothiocyanate, enzymes, rat: 2182
  nitroquinoline oxide + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
  nitrosamine derivatives, enzyme and RNA metabolism: 751
  2-nitrosofluorene, rat: 86
  nitrosoguanidine, rat: 1431
  N-nitrosohexamethyleneimine, rat: 271,1726
  nitrosomorpholine, rat: 317,1743
  pathogenesis, review (book): 1743
  prenatal or neonatal, children, review: 2502
  pyrrolizidine alkaloids, review: 1148,2498

LIVER CARCINOGENESIS (contd.)
- RNA from chemically induced hepatoma, mouse: 2067
- ^{232}Th (Thorotrast), human: 1935
- thioacetamide, rat: 523,2182
- m-toluenediamine, effect of other carcinogens, rat: 2277
- urethan, mouse: 301,1232,1736,2306
  - rat: 259,260

LIVER DISEASES
- cirrhosis
  - alcoholic, with CCl_4 poisoning, possible liver carcinogenesis: 526
  - formation of liver metastases, animal and human: 1315
  - hepatic vein thrombosis, CCl_4 + methylcholanthrene, rat: 1737
  - lipotrope-deficient diet, rat: 1239
  - liver cancer, Mexico City: 649
    - Scotland (Glasgow and western areas): 856
  - mouth cancer, occupational groups, California: 158
- portal hypertension, tumor stimulation, rat: 193
- *Taenia* infestation, transformation to hepatoma, rat: 2179
- Type I glycogen storage disease, hepatoma, brothers: 1328

LIVER NEOPLASMS
- cell genetics, mechanism, review: 1155
- chromosomes
  - metastasis from stomach cancer, human: 2459
  - "minimal-deviation" rat hepatomas: 2486
- epidemiology
  - carcinogen-containing foods, review: 1143
  - children, congenital defects: 167
    - review: 2502
    - U.S.: 168
  - cirrhosis, Mexico City: 649
  - India: 642
  - Japan: 857
    - mycotoxins, fermented foods: 1230
    - smoking and diet: 1935
  - mycotoxins, review: 2208
  - Portuguese East Africa: 623
  - Scotland (Glasgow and western areas), cirrhosis: 856
  - Transvaal: 401
  - Uganda, aflatoxin-contaminated foods: 2677
  - Venezuela: 149
  - worldwide: 2112
- frequency, aged, Italy (Sulmona): 2655
- hemangioendothelioma, monkey: 1643
- hemochromatosis: 2481
- hepatoma
  - cell growth rate and nucleolar RNA, rat: 2177
  - hereditary mammary tumors, mouse strain: 174
  - "minimal-deviation" type, nucleolar RNA content, rat: 194
  - pathogenesis, rat: 458
  - siblings: 183
  - transplanted, aflatoxin inhibition, rat: 985

LIVER NEOPLASMS (contd.)
- incidence, effect of parity, 5 generations of agent-free mice: 180
- intact or hepatectomized mouse: 658
- metastatic, cirrhosis, animal and human: 1315
  - dextran stimulation, rabbit: 293
- mitochondrial DNA, rat and human: 2180
- Novikoff hepatoma (rat)
  - properties of ribonucleoprotein particles: 2181
  - virus-like particles: 2353
- relationship of growth rate to glutaminase activity, rat: 2450
- RNA analysis, rat: 2487
- "solid-state" reaction to fibrosis, review: 1140
- spontaneous
  - ethanol inhibition, mouse: 2178
  - myelolipoma, epidemiology, wild Felidae in captivity: 409
- surface contact of cells *in vitro*, rat: 2484
- transplanted or induced, enzyme patterns, rat: 2711
- Type I glycogen storage disease, brothers: 1328
- variant alkaline phosphatase, human: 2476
- Watanabe I hepatoma, transformation from *Taenia* cyst, rat: 2179
- Yoshida hepatoma #7974 (rat), ultrastructure, virus particles: 1121

LSD (See under Hallucinogens)

LUCITE (See under Plastics)

LUCKÉ VIRUS (See under Virus, herpes-type)

LUNG
- antigenic component, benzidine-treated rat: 2535
- asbestos bodies, pathogenesis, guinea pig: 1723
- benzpyrene hydroxylase induction, phenylbenzothiazoles, rat: 1187
- bioassay, rubber dust, monkey: 57
- cilia, effect of benzpyrene, salamander: 1479
- defense mechanisms, effect of air pollutants or tobacco smoke, guinea pig: 2788
- diffuse interstitial fibrosis, with lung cancer: 395
- distribution
  - benzpyrene, rat or hamster: 327,2040
  - nickel carbonyl, rat: 498
- nucleic acids, effect of carcinogens, rat: 1410
- phagocytosis *in vitro*, effect of tobacco smoke and sulfhydryl agents, rabbit: 721
- radioisotope distribution
  - aerosols, dog: 1374,1382,1392
    - rat or mouse: 1390,1391
  - dog: 1386,1387
  - rat: 1380,1389
- scar tissue, particle uptake, rat: 1721
- tobacco smoke
  - constituent retention, human: 969
  - distribution, human preparation: 720
  - smoke, toxicity, dog: 1215
    - rabbit: 2248,2538
- toxicity, petroleum distillates, rat: 1722

- LUNG (contd.)
  - radioisotope aerosol, dog: 1374
- LUNG CARCINOGENESIS
  - aflatoxin B_1, mouse: 30
  - aminochrysene, mouse: 2254
  - animal, review: 683
  - antitumor agents, mouse or rat: 92,2044,2045
  - asbestos, mouse: 1783
  - benzpyrene, mouse: 2050,2249
  - bismuth subcarbonate, rat: 499
  - ^{144}Ce aerosol, rat: 1378
  - corn oil, mouse: 1788
  - cycasin, rat: 94
  - dibenzpyrene, effect of vehicles or derivatives, mouse: 1451
  - dichlorodiaminodiphenylmethane, rat: 2251
  - diethylnitrosamine, mouse: 1469
  - dimethylbenzanthracene
    - mouse: 318
      - effect of β-naphthoflavone: 1453
      - fetal: 2263
      - strain differences: 1725
    - + X-rays, rat or hamster: 2011
  - dimethylnitrosamine, rat: 976
  - fluorocarbons, rat: 492
  - human, review: 2493
  - hydroxyurethan or urethan, effect of thymine, mouse: 2547
  - isoniazid
    - possible, pulmonary TB, smoking: 2768
    - rat: 492
  - isoniazid metabolite (hydrazine sulfate)
    - mouse: 2046
    - rat: 492
    - virus particles, mouse: 493
  - methylcholanthrene, mouse: 1791,2045
    - + nitroquinoline oxide, rabbit: 1454
  - methylnitrosourea, mouse: 321
  - methylnitrosourethan, mouse: 2044
  - nickel, review: 1669
  - nitrogen dioxide, rat: 98
  - nitroquinoline oxide, effect of aluminum compounds, mouse: 965
    - rabbit: 37
  - nitrosoheptamethyleneimine or nitrosooctamethyleneimine, rat: 2250
  - occupational dust inhalation, Japan: 715
  - plastics, chondrosarcoma, human: 2005
  - possible, mineral oil, human: 2247
  - radiation, species difference, rodent: 933
  - radioactive particles, mathematical model: 1696
  - tobacco smoke, review: 1131,1132,2205
  - urethan
    - hamster: 2047
    - mouse: 285,322,716,1232,2044,2045,2306, 2547,2548
      - review: 2739
  - Yaba virus, monkey: 1063,1064
- LUNG DISEASES
  - bullous emphysema, lung cancer: 653
  - diffuse interstitial fibrosis, lung cancer
    - brothers: 1641
    - malignant transformation: 875
  - interstitial cell pneumonia, larynx cancer, smoking: 190
- LUNG DISEASES (contd.)
  - non-malignant, lung cancer, women: 1631
    - occupational asbestos exposure: 507
  - scars, lung cancer: 482
  - smoking, sputum cytology: 1210
  - *Streptomyces* infection with aflatoxin contamination, human: 536
  - tuberculosis
    - larynx cancer, Italy: 1970
    - lung cancer: 1928
      - asbestos bodies, Italy (Perugia): 494
      - smoking, Minnesota (Minneapolis): 1083
        - Tennessee (Memphis): 2768
      - USSR (Leningrad): 1082
    - mortality, and cancer mortality, Bulgaria (Plovdiv): 867
    - plombage (plastic spheres), chondrosarcoma of lung: 2005
    - scar, lung scar cancer: 2006
      - melanoma metastases: 2767
    - tuberculous salpingitis, Fallopian tube cancer: 1644
- LUNG NEOPLASMS
  - associated atypical epithelial proliferation and fibrosing alveolitis, pathology: 200
  - bronchogenic carcinoma, with bullous emphysema: 653
  - CNS metastases, frequency: 2656
  - chondrosarcoma, foreign-body reaction to plastic spheres, human: 2005
  - diffuse interstitial pulmonary fibrosis: 395, 875
    - smoking, brothers: 1641
  - dissemination, traumatized soft tissues: 2766
  - environmental carcinogens, review: 470,1360, 2734
  - epidemiology
    - Australia: 1302
    - Austria, peptic ulcer: 396
    - Brazil (Rio de Janeiro): 2669
    - Britain (London): 159,503
    - California, ethnic groups, smoking, women: 32
      - occupation and smoking: 158
    - Canada: 1085
    - Rumania, smoking: 2668
    - Czechoslovakia: 2114,2134
      - air pollution: 2114
    - France (Bordeaux): 2671
    - Germany (Leipzig): 385
    - Italy: 1930,1931,1959,2655
      - asbestos bodies: 2541,2543,2544
    - Japan, air pollution: 1929
      - Hiroshima and Nagasaki, smoking: 927,1176
    - Natal (Africans), smoking: 1065
    - New York City, smoking: 70
    - Poland: 1924
    - Portuguese East Africa, smoking: 623
    - review: 228,443,449
      - urban and rural: 647,648
    - screening of asymptomatic smokers for carcinoma *in situ*: 2546
    - Switzerland, silicosis: 2246
    - Tennessee (Memphis), TB and smoking: 2768
    - U.S., smoking, men: 68

LUNG NEOPLASMS (contd.)
      urbanization: 975
    USSR, blood groups (ABO): 636
      women, smoking: 1631
    worldwide: 2112
  etiology, human, review: 2493
  exposure to poisonous gases, Ohio (Cleveland): 2439
  experimental models of human cancer, review: 1136
  neonatal development, mouse: 425
  occupational: 158,1337,1932
    arsenic: 1478
    asbestos: 158,494,963,1207,2541,2543,2544
      review: 14
    chemical factory workers, smoking: 1455
    mineral exposure, review: 2731
    petroleum asphalt exposure, U.S.: 2540
    uranium miners: 2521,2523,2524,2525
      Czechoslovakia (Jáchymov), smoking: 2231
      U.S., review: 2495
        smoking, American Indians: 2522
  pathogenesis: 1337
  premalignant and malignant, smokers, pathology: 2545
  rare types, children USSR (Moscow): 2930
  recurrent nerve paralysis: 383
  scar tissue: 482,1702,2239
    particle uptake, rat: 1721
  scleroderma: 2194
  sex chromatin, women: 417
    difference: 2670
  smoking: 32,68,70,494,503,623,927,963,975,1065,1083,1085,1132,1176,1214,1246,1337,1631,1932,1959,2114,2125,2231,2522,2545,2546,2668
    enzyme metabolism of alveolar macrophages: 1211
    filtered or unfiltered cigarettes: 70,502
    low- or high-nitrate tobacco, Britain and France: 1132
    peptic ulcer: 879
    review: 1,690,914,2205
    sputum cytology: 1210
    smoking, Tennessee (Memphis): 2768
  "solid-state" reaction to fibrosis (TB, asbestos, silicosis), review: 1140
  spontaneous, effect of tobacco smoke extract, mouse: 67
  trace metal content, human: 2483
  tuberculosis: 1928
    asbestos bodies: 494
    scars: 2006,2768
      metastatic melanoma: 2767
    smoking: 1083
    USSR (Leningrad): 1082
LYMPHATIC TISSUE
  methylcholanthrene sarcoma, immunity, rat: 2292
LYMPHOMA, MALIGNANT, EXPERIMENTAL
  Aleutian disease of mink, genetics: 1801
  amphibia, review: 908
  bovine lymphosarcoma, buffaloes, India: 870
  Burkitt type, leukemia virus-induced, mouse: 571
LYMPHOMA, MALIGNANT, EXPERIMENTAL (contd.)
  epidemiology
    boxers and other dogs: 560,561
    lymphosarcoma, cattle, sheep and swine, Great Britain: 406,2162
  genetics, autoimmunity, NZB mice: 1129,1342
  Gross virus (mouse), cell lines, properties: 1021
  incidence, effect of isoniazid metabolite (hydrazine sulfate), mouse: 2046
  induction
    antitumor agent (procarbazine), rat: 92
    estratriene derivatives, reticulum cell sarcoma, mouse: 85
    iron-carbohydrate complex, mouse or rat: 332
    nitrosohexamethyleneimine, rat: 1726
    tobacco tar, mouse: 722
    urethan + croton oil or anthracene derivative, mouse: 301
  L5178Y or P-388 (mouse), virus-free, effect on immunity, mouse: 2592
  NK/Ly (mouse), stimulation by antitumor agents: 83
  mastocytoma, genetic susceptibility, dogs: 2160
    virus-like particles, dog: 1867
  plasmacytoma, mineral oil, mouse: 1352,1441,1767,2314
    virus isolation, mouse: 1013
  radiation-induced, dietary factors, mouse: 2012
    virus-like particles, hamster: 1710
  reticulum cell sarcoma, pets and their owners: 163
  spontaneous
    cats, transmission: 163
    dogs, transmission: 163,559,794,2398
      enterovirus or mouse leukemia virus-like particles: 2830
    Hodgkin's-like reticulum cell tumor, leukemia virus isolation, mouse: 787
    incidence, aged *Mastomys natalensis*: 1291
    or induced, polyoma virus sensitivity, mouse: 1568
    reticulum cell sarcoma, Japanese quail, attempted virus isolation: 2406
    transmissible, amphibian (*Xenopus*): 2334
LYMPHOMA, MALIGNANT, HUMAN
  Burkitt's
    cell lines
      attempted EB virus rescue: 2435
      complement-fixing antigen and herpes-type virus: 2386
      P3-J, antibody production *in vitro*: 2462
      reovirus isolation: 2909
    epidemiology
      Brazil: 2146
      Congo (Katanga): 1296
      Kenya (western): 2926
      malaria endemic areas, review: 1156
      Norway: 400
      Poland (Szczecin): 1075
      review: 228
      Sierra Leone, children: 2442

YMPHOMA, MALIGNANT, HUMAN (contd.)
    - serum virus antibodies, U.S., review: 2753
  - karyotype: 1114,1260,1648,2485
  - virus detection and classification: 344,772,1060,1260,1914,2911
- Chediak-Higashi anomaly (genetic), possible virus induction: 1801
- chromosomes: 181,182,432,433,664,1341,2485, 2513
- epidemiology
  - Argentina, leprosy: 866
  - chemists, U.S.: 2245
  - children, congenital defects: 167
  - Israel: 1108
    - children: 403
    - ethnic groups: 2139,2955
  - Italy (Turin): 1074
  - leprosy: 866,1107
  - offspring of women with breast cancer: 1953
- familial, chromosomes: 181
- g.i. tract, frequency, children: 2662
- giant follicular lymphoma or reticulum cell sarcoma, from Hashimoto's thyroiditis: 882
- growth rate, method of determination: 176
- Hand-Schüller-Christian disease, virus-like particles, child: 1799
- herpes simplex infection, complication of immunosuppression (kidney graft): 1646,1800
- herpes-type virus: 1055,2103,2104,2105
- Hodgkin's disease
  - anticonvulsant-treated epilepsy: 1758
  - epidemiology
    - review: 905
    - U.S.: 1297,2147,2772
    - worldwide, sex ratio: 2664
  - immunoglobulin production *in vitro*: 549
  - with leukemia, karyotype: 1650
  - occupational, pine pollen exposure, geographical variations, U.S.: 2772
  - phytohemagglutinin transformation of lymphocyte cultures: 2474
  - stomach, frequency: 2663
  - virus isolation: 593
- immunoglobulin synthesis: 433,1056,2724
- isolation and properties of adenovirus type 1: 2368
- Kaposi's sarcoma, father and son: 2720
- *Mycoplasma* antibodies: 778
- mycosis fungoides
  - radiation-induced reticulum cell sarcoma: 18
  - sister and brother: 1326,1327
  - superimposed on photodermatosis: 2008
- reticulum cell sarcoma
  - familial, chromosome markers: 181
  - radiation-induced, mycosis fungoides: 18
  - transmission, pets and their owners: 163
    - spouses: 187
- small intestine, malabsorption syndrome: 1973
- systemic lupus erythematosus: 883
- virus-like particles: 542,1055,1057,1058, 1059,1802

YSERGIC ACID DIETHYLAMIDE (See under Hallucinogens)

MAGNESIUM
- deficiency, diet and soil, leukemia endemic area, Poland, review: 2730

MAGNESIUM CHLORIDE
- effect on benzanthracene carcinogenesis, mouse: 320

MALABSORPTION SYNDROME
- and lymphoma of small intestine: 1973

MALARIA
- distribution, Burkitt lymphoma, review: 1156

MALIGNANT TRANSFORMATION
- achalasia of esophagus to cancer, review: 2494
- alveolar wall cell to lung cancer: 1337
- asbestosis to mesothelioma, mechanism: 1203
- benign
  - bone diseases, human: 1123,1124
  - cartilaginous tumors to chondrosarcoma of bone, frequency: 2979,2980
  - fibroadenoma phylloides to breast carcinoma: 2725
- carcinogen-treated cervix or ovary tissue, epithelial-mesenchymal interactions, mouse: 2323
- cervix dysplasia to carcinoma *in situ*, mechanism: 1099
  - polyps to cancer of the cervix or endometrium: 2686
- chemical, mechanism, hamster: 1475
- chromoblastomycosis, skin cancer: 881
- cystic duct stump (post-cholecystectomy) to adenocarcinoma: 1334
- diagnosis, human cancer: 2726
- discoid lupus erythematosus to skin cancer: 2469
- esophageal diverticuli to carcinoma: 1335
- giant cell tumor of bone to giant cell sarcoma, frequency: 2978
- goiter to thyroid cancer: 1943
- Hashimoto's thyroiditis to malignant lymphoma: 882
- hemochromatosis to hepatoma: 2481
- hereditary epidermodysplasia verruciformis to bowenoid carcinoma of skin, possible role of virus: 2965
- human WBC cell line, karyotype: 1651
- hyperplastic mammary nodules to carcinoma, pituitary hormone effects, mouse: 2363
- hypertrophic gastropathy (Menetrier's disease) to carcinoma of stomach: 2968
- immunity disorders to myeloma and related diseases: 2706
- interstitial pulmonary fibrosis to lung cancer: 875
- intraductal papilloma or papillomatosis to breast cancer: 1332
- keloid-like lesions to fibrosarcoma of skin: 2516
- larynx papilloma to carcinoma: 1972
- malabsorption syndrome and intestinal lymphoma: 1973
- malignancy associated nuclear morphology: 1338
- mechanism, review: 10,252,458,460
- Mibelli's porokeratosis to skin cancer: 1333
- mouse embryo cells, effect of culture medium: 890,2188

MALIGNANT TRANSFORMATION (contd.)
ovary *in vitro*, sarcoma induction *in vivo*: 2197
neurofibromatosis (von Recklinghausen)
associated brain tumor and radiation-induced thyroid cancer: 2018
frequency, children: 2727
nevus to melanoma, traumatic, human: 2242, 2705
odontogenic cyst to carcinoma, review: 1998
Paget's disease to bone sarcoma, frequency, England (Leeds and Bristol): 2936
papillomatosis to carcinoma of larynx, radiation-induced, child: 2709,2763
pilonidal sinus to skin carcinoma, case and review: 2966
polyposis to colon cancer: 1117
associated brain tumor, adolescent: 2707
familial: 877,896
Gardner's syndrome: 2967
review: 2512
possible, pulmonary scleroderma to lung cancer: 2194
respiratory papillomatosis to carcinoma, smoking: 972
rheumatoid arthritis to leukemia, mechanism: 1336
risk, rectocolitic adenomatous polyps: 876
role of cell membranes, review: 909
schistosomiasis to bladder cancer, diagnosis, urinary LDH: 2171
spontaneous
malignancy of transformed marmoset kidney cells: 2414
rat liver cell culture: 2187
cell line, induction of ovary tumors, mouse: 2196
stomach ulcer
frequency, East Germany (Leipzig): 2769
lymphosarcoma of stomach: 1630
resection site, stomach cancer: 897,898
systemic lupus erythematosus, leukemia or lymphoma: 883
Taenia infestation to hepatoma, rat: 2179
tuberculous salpingitis to tubal cancer: 1644
ulcerative colitis or regional enteritis to intestinal cancer: 878,1154,2172,2195
UV-irradiated rat or mouse embryonic cells: 2758
varicose ulcer to melanosarcoma: 880
viral, cell surface properties: 1574,1575
xeroderma pigmentosum to skin cancer, sun exposure, brothers: 2173
MAMMARY CARCINOGENESIS, EXPERIMENTAL (See also under Virus, mammary tumor)
antitumor agent (procarbazine), rat: 92
benzanthracene derivatives, structure-activity relationship, rat: 2033
corn oil, mouse: 1788
cycasin, rat: 759
dimethylbenzanthracene, rat: 50,61,264,283, 310,312,1409,1434,1436,1453,1487,1488,1489, 1770,1779,1780,2068,2184,2570,2571,2572, 2573,2591
estratriene derivatives, mouse or rat: 85
estrone, tumor regression patterns, rat: 1188
MAMMARY CARCINOGENESIS, EXPERIMENTAL (contd.)
fluorenylacetamide, rat: 514
formamide derivative, rat: 1471
3-hydroxykynurenine, mouse: 87
methylcholanthrene, mouse: 760,1768,1782
rat: 262,264
multiple-agent screening, rat: 267
norethynodrel, mouse: 2814
pituitary graft, mouse: 2590
radiation
monkey: 2515
mouse: 2012
rat: 481,1705,2085,2761
role of estrogens, rat, review: 1139
thiazole derivatives, rat: 1470
urethan, rat or mouse: 259,301
MAMMARY CARCINOGENESIS, HUMAN
contraceptives, adolescent: 1437
review: 1662
MAMMARY GLAND
aging *in vivo*, agent-positive or agent-free mice: 1051
DNA, effect of carcinogen, rat: 1789
effect of dimethylbenzanthracene, rat: 767,1772,2319
hyperplastic alveolar nodules
chromosome morphology *in vitro* mouse: 185
effect of hormones, mouse: 1617
mammary tumor virus, mouse: 137,1617
in vitro viability, mouse: 178
mammary tumor virus propagation after mastectomy, mouse: 133
organ culture and transplantation, mouse: 216
pituitary graft response, agent-positive or agent-free mouse: 179
genetic regulation, mouse: 1548
premalignant hyperplasia, benzpyrene induction, effect of androgen or light exposure, mouse: 2574
secretion, effect of endocrine ablation, mouse: 215
MAMMARY NEOPLASMS, EXPERIMENTAL (See also Virus, mammary tumor)
cat, virus particles: 1595
chromosome morphology, mouse: 654
development from mammary nodules, effect of lactation, mouse: 382
dimethylbenzanthracene-induced, hormone sensitivity, rat: 276,279,2302
DNA response to estrogen or insulin as index of growth rate, mouse: 54
enzymes, rat: 2711
estrone-induced, androgen sensitivity, rat: 2301
hereditary, agent-positive or agent-free mouse: 173
with hereditary hepatoma, strain characteristics, mouse: 174
hormone sensitivity, mechanism, review: 225
hybrid mouse strains: 1892
incidence, effect of isoniazid metabolite (hydrazine sulfate), mouse: 2046
parity, 5 generations of agent-free mice: 180
mammary tumor virus-positive mice, effect of liver extract: 2365

- MAMMARY NEOPLASMS, EXPERIMENTAL (contd.)
  - methylcholanthrene-induced, hormone sensitivity, rat: 2302
  - postpartum regression, lysosomal enzymes, rat: 2573
  - premalignant, detection, mouse: 500
  - radiation-induced, dietary factors, mouse: 2012
    - virus-like particles, rat: 2085
  - secretion and ultrastructure, rat: 2591
  - selective aggregate formation in vitro, mouse: 1049
  - spontaneous
    - epidemiology, dogs, USSR (Moscow): 2163
    - enterovirus-like particles, dog: 2830
    - immunity, mouse: 734,840
    - incidence, effect of estrogens, rat: 47
    - reproductive history, mouse: 657
    - tumor growth and fibrinolysis, mouse: 2812
  - steroid content, rat: 2572
  - tumor-specific antigens, mouse: 2611
  - virus-induced
    - host genetics, mouse: 118
    - immunity, mouse: 734,840
    - pathology, mouse: 130
  - virus production, mouse: 1277,1542,2083,2084
  - Walker 256 carcinoma, karyotype of new subline, rat: 428
- MAMMARY NEOPLASMS, HUMAN
  - adrenal function: 1119
  - appendectomy: 1077
  - associated endocrine diseases: 2443
  - benign (fibroadenoma phylloides), histogenesis and malignant transformation: 2725
  - cancer morbidity and mortality in offspring: 1953
  - chromosomes: 655,1112
  - clear cell hidradenoma, morphogenesis: 201
  - CNS metastases, frequency: 2656
  - cystosarcoma phylloides and fibroadenoma, age incidence: 414
  - epidemiology
    - Africa: 151
    - age changes ("Clemmesen's hook"), Scandinavia: 2948
    - Argentina (Buenos Aires), ABO and Rh blood groups: 2939
    - benign tumors and axillary metastases, Tennessee (Nashville): 2949
    - California: 2445,2446
    - Czechoslovakia: 2114
    - children of women with breast cancer: 1953
    - England (southeastern): 2148
    - goiter region, USSR (Ukraine): 638
    - Hawaii, Japanese: 2687
    - identification of high-risk groups: 1971,1997,2150
    - Italy: 1321,2653
    - Japan, Hiroshima-Nagasaki: 474
    - Kirghiz SSR, premalignant diseases, ethnic groups: 2120
    - mass screening method: 640
    - New York City: 2153
    - Northern Ireland, pregnancy: 2152
    - Peru (Arequipa), parity: 619
    - Poland: 156,860,1924
- MAMMARY NEOPLASMS, HUMAN (contd.)
    - review: 228,443
    - U.S.: 2151
    - USSR, blood groups: 636
      - regional variations: 2119
    - West Germany (Düsseldorf), blood groups: 411,1298
    - worldwide: 2112,2113
  - estrogen stimulation: 515
  - familial, bronchus cancer in brothers, genital cancer in sister: 1343
    - mother and daughter: 641
  - growth rate, mathematical model: 1366,1967
  - hormone metabolism: 860,885
    - review: 677
  - intraductal papilloma or papillomatosis: 1332
  - male, frequency: 2447
    - radiation-induced: 475
  - mammography, review: 2216
  - medullary (solid circumscribed) carcinoma, incidence: 1309
  - metastases to traumatized soft tissues (oophorectomy scar): 2766
  - myocardial infarct: 1290
  - pure adenoma, differential diagnosis: 886
  - radiation leukemogenesis: 1699,1700
  - risk
    - estrogen excretion pattern, review: 2215
    - genetics: 1323
    - histories of hysterectomy (artificial menopause): 399
    - "prominent duct" pattern, review: 2223
  - sex chromatin: 1345,2716
  - "solid-state" reaction to fibrosis, review: 1140
  - steroid excretion, review: 2149
  - thyroid hypofunction, review: 5
  - trace metal content: 2483
  - virus-like particles: 131,1059,1276,1805,1895
- MANGANESE
  - soil, nasopharynx cancer, Kenya: 2927
- MAREK'S DISEASE (See also under Leukosis, avian)
  - cross-reactivity with avian leukosis-sarcoma virus, chicken: 2359
  - immunization, chicks: 2109
  - isolation and properties of virus: 1015,1016, 1017,1531,1532,1913,2110
- MAREK'S DISEASE VIRUS (See under Virus, herpes-type)
- MEDIASTINAL NEOPLASMS
  - frequency of malignant tumors, children: 2660
- MENOPAUSE
  - breast cancer risk: 399
- MERCURY
  - analysis, human tumors: 2970
- MESENTERIC NEOPLASMS
  - incidence, effect of parity, agent-free mice: 180
  - sarcoma, induction, acetamidofluorene + methylcholanthrene, hamster: 303
- METABOLISM (glycolysis & respiration)
  - associated enzymes, liver dimethylaminoazobenzene carcinogenesis, rat: 978
  - effect of aminoazo dyes, rat liver mitochondria membranes: 2806
    - carcinogens, normal cells: 1713,1747

METABOLISM (glycolysis and respiration) (contd)
  embryonic and tumor cells, comparison, mouse: 2479
  induced ear duct tumors, rat: 2299
    skin tumors, monkey: 272
  Rous virus transformation, chick embryo cells: 1048
  thymic, high- or low-leukemia mouse strains: 892
METABOLISM DISORDERS
  glucose-6-phosphatase deficiency (Type I glycogen storage disease), hepatoma, brothers: 1328
  glucose-6-phosphate dehydrogenase deficiency, cancer incidence, Sardinia: 2167
    hereditary disorder, cervix cancer, tumor enzymes: 667
  hemochromatosis, hepatoma: 2481
  progesterone, cancer of endometrium, review: 2504
METALS
  analysis, asbestos: 1464
  electron spin resonance spectra, normal and tumor cells: 2477
  mechanism of tumor induction, review: 2209
  occupational exposure, lung cancer, review: 2731
  trace, malignant and normal human tissues (breast, lung, colon): 2483
    soil, nasopharynx cancer, Kenya: 2927
    spontaneous tumor incidence, animal: 2291
METALS, HEAVY
  air pollution, WHO standards of permissible levels: 2771
  trace elements, human tumors: 2970
METHANE, BIS(N-METHYLANILINO)-
  connective tissue tumors, rat: 89
METHANE, BIS(MORPHOLINO)-
  connective tissue tumors, rat: 89
METHANE, 3,3'-DICHLORO-4,4'-DIAMINODIPHENYL-
  lung and liver tumors, rat: 2251
METHANESULFONATE, METHYL-
  DNA and RNA alkylation, rat: 1410
  leukemia, mouse: 531
  metabolism, rat: 1400
METHANOL, METHYLAZOXY- (See Cycasin aglycone)
3-METHYLCHOLANTHRENE
  anti-uterotropic effect, mouse: 2025
  bladder tumors, mouse or rat: 2551
  brain tumors, mouse: 487
    virus-like particles, mouse: 1452,1872
  + CCl_4, liver cirrhosis and hepatic vein thrombosis, rat: 1737
  cervix or uterus cancer, mouse: 952,953,1432, 1753,1755,2575,2815
  + croton oil, foot appendage tumors, snail: 2267
  distribution, mouse: 307
  effect on
    carbon monoxide-binding particles, rat liver: 2316
    dimethylnitrosamine metabolism, rat liver: 1423
    DNA, mechanism: 1407,1408
    enzymes, rat liver: 2055,2317
    estrogen binding, rat uterus: 1752
3-METHYLCHOLANTHRENE (contd)
    genetic transcription, rat liver chromatin: 1420,2797
    immunity, newborn mouse: 1415
    liver cholesterol *in vitro* or *in vivo*, rat: 41
    m-toluenediamine liver carcinogenesis, rat: 2277
    microsomal metabolism, rat liver: 747,748, 1429,2028,2795
    nucleolus, rat liver: 2062
    rat prostate *in vitro*: 2024
    RNA, rat liver: 2315
    spontaneous leukemia incidence, rat: 2308
    trachea *in vitro*, rat: 964
  epididymis tumors, animal: 287
  epithelial tumors, snail: 510
  fibrosarcoma, transplantation antigens, mouse: 311
  intestinal absorption, rat: 2320
  kidney tumor, monkey: 1416
  leukemia, mouse: 307,954,1438
    polyoma virus sensitivity, mouse: 1568
  liver tumors, effect of acetamidofluorene, hamster: 303
  lung tumors, DNA, mouse: 2045
    rabbit: 1454
  lymphoma, cell-free passage, mouse: 1499
  malignant transformation, single-cell prostate culture, rat: 1771
  mammary tumors, mouse: 760,1768,1782
    rat: 262,264,1139,2302
  metabolism, microsomes, rat liver: 2318
  multiple tumors, mouse: 1791
  muscle tumors, virus-like particles, mouse: 1452
  ovary tumors, hormonal activity, pregnancy and lactation, rabbit: 2577
  oxidation, free radical formation: 937
  preneoplastic brain tumors
    pathology and enzyme patterns, mouse: 2817
    virus-like particles, mouse: 2854
  preneoplastic liver tumors, protein and -SH levels, rat: 51
  prostate tumors, hormone effects, rat: 766
  reaction with nucleohistones, cell-free system: 491
  resistance, host immunity, mouse: 1786
  s.c. sarcoma
    guinea pig: 758
    mouse: 694,734,735,1192,1445,1446,1492,1568, 2294,2295,2296,2312,2463,2559,2812
    rat: 736,951,1190,1196,2292,2293
  skin tumors, mouse: 60,286,533,731,733,1169, 1444,1446,1496,1730,1734,1778,2282,2557
  stomach tumors, induction method, rat: 1750
  thyroiditis, rat: 708,1196,2536,2780
  toxicity, monkey: 1785
  transformation, tissue culture: 115,1771,2034,2616
  vagina tumors, hormone effects, mouse: 2575
MINERALS
  deficiency, effect on *Agrobacterium tumefaciens* tumors, tomato plants: 1180
  soil, esophagus cancer incidence, South Africa (Transkei): 1219
  trace elements (soil, water, food), cancer incidence: 2118

TOCHONDRIA
- mutation, chemical carcinogenesis: 333

TOSIS
- dimethylaminoazobenzene liver carcinogenesis, rat: 1234
- effect of carcinogenic or non-carcinogenic nitroquinolines, *Tetrahymena*: 2530

LYBDENUM
- soil, nasopharynx cancer, Kenya: 2927

RPHINE SULFATE
- stimulation, mouse brain tumor *in vitro*: 2325

TOR VEHICLES
- exhaust gas, benzpyrene emission: 328

UTH
- epithelium, DNA-dependent dye binding, smokers and nonsmokers: 52
- mucosa, effect of calcium hydroxide, rat: 63
  - pathology, betal chewing, Ceylon: 2124
  - photochemical repair, smoking: 1709

UTH DISEASES
- periodontoclasia and tooth loss, smoking: 974

UTH NEOPLASMS
- adenovirus antigens: 1842
- ameloblastoma of jaw, epidemiology, Africa (Tanzania and Uganda): 2691
- anaplastic transformation after radiotherapy: 1216
- basement membrane ultrastructure: 2710
- benign odontogenic myxoma of jaw, nevoid basal cell carcinoma syndrome: 2466
- epidemiology
  - Australia (Victoria), smoking: 1084
  - California, liver cirrhosis and occupation: 158
    - smoking: 2672
  - children, review: 2500
  - chronic irritation and intrinsic factors, review: 2
  - India, alcohol and tobacco use: 973
- etiology, review: 12
- gingiva, betel chewing and tobacco use: 501
- immunology (serum reaction with viral RNA): 547
- jaw tumors, epidemiology, Korea: 2692
- lip or tongue, mental disorders: 672
- pipe smoking, human: 2789
- poorly fitting dentures: 2015
- premalignant, epidemiology, Papua/New Guinea, smoking: 397
  - hyperkeratosis, ultrastructure, human or hamster (dimethylbenzanthracene-induced): 2810
- smoking: 506
  - glucose-6-phosphate dehydrogenase deficiency, Italy (Sardinia): 2167
  - Portuguese East Africa: 623
- tobacco chewing and poor oral hygiene: 1216
  - review: 1133
- tongue cancer, congenital ichthyosis, child: 2467
- tumor growth kinetics: 2959

UCOPOLYSACCHARIDES, ACID
- production, Rous sarcoma virus-transformed chicken or mammalian cells: 2358

USCLE NEOPLASMS
- rhabdomyosarcoma, cobalt induction, mechanism, rat: 2290

MUTAGENESIS
- antimetabolites, *Drosophila*: 1189
- atmospheric $^{14}CO_2$, testing method, mouse: 2227
- caffeine, animal and human: 1185
- carcinogens, bacterial infection (mouse), method: 2259
  - hamster cells: 1797
  - mouse: 1467
  - tryptophan metabolites, human embryo cells: 2529
- fusel oil, bacteria and mouse: 2260
- LSD, fungi: 2531
- methylnitrosamine or methylnitrosourethan, *Drosophila*: 2261
- methylnitrosoguanidine, bacteria: 2774
  - *Drosophila*: 2773
- methylnitrosourethan or diepoxybutane, bacteria: 2775
- nitroquinoline oxide, yeast: 2584
- polynuclear hydrocarbons, yeast: 2258
- *Salmonella*, cycasin and its aglycone, mouse: 1405
- screening of environmental chemicals, method, mouse: 53
- somatic, host immunity and aging, review: 2510
- tobacco smoke component (acrolein), algae: 1720
- tryptophan metabolites (3-hydroxykynurenine or 3-hydroxyanthranilic acid), human embryo cells: 2035
- viral, human WBC cultures: 1841

Mycoplasma
- antibody formation, leukemia: 778
- isolation, bone marrow, human leukemia: 1804

MYCOSIS FUNGOIDES (See under Lymphoma)

MYELOMA AND RELATED DISEASES
- epidemiology, review (book): 2200
- HIPA mesenteric and ascites plasmacytoma, virus particles, mouse: 2824
- immunoglobulin abnormalities: 2723
- myeloma
  - dog, myeloid leukemia in owner: 163
  - immunology and attempted virus isolation: 557
  - marker chromosomes, human: 1645
- pathogenesis: 2706
- plasmacytoma
  - IgD type, complication of anabolic therapy, muscular dystrophy: 1757
  - induction, aliphatic hydrocarbon, mouse: 2297
  - marker chromosomes, human: 1645
  - mineral oil-induced, mouse: 315,1352,1441, 1767,2314
    - role of sex hormones, mouse, review: 1352
  - Pristane (2,6,10,14-tetramethylpentadecane), mouse: 2297
  - respiratory, epidemiology, Scotland (Aberdeen): 148
  - virus isolation, mouse: 1013
- plasmacytosis with dysproteinemia, immunology and attempted virus isolation: 557

β-NAPHTHOFLAVONE
- effect on dimethylbenzanthracene carcinogenesis, mouse or rat: 1453

- 2-NAPHTHOL-3,6-DISULFONIC ACID, 1-(2,4-XYLYLAZO)-, DISODIUM SALT (Ponceau MX; food coloring)
  - liver tumors, mouse: 2802
- α-NAPHTHYLAMINE
  - analysis, tobacco smoke: 1456
- β-NAPHTHYLAMINE
  - analysis, tobacco smoke: 1456
  - bladder tumors
    - dog: 2552
    - monkey: 2253
    - review: 2733
  - metabolism, effect of phenobarbital, dog: 40
  - nitrogen mustard derivative, s.c. tumors, rat and mouse: 2813
  - occupational exposure, rubber factory, bladder cancer, England (Birmingham): 2937
  - product (benzoquinoline-69), liver and s.c. tumors, rat and mouse: 2553
  - s.c. tumors, mouse or rat: 2552
- NAPHTHYLAMINE, TOLYLAZO- (Oil Yellow OB)
  - toxicity, liver, mouse or rat: 2794
- NASOPHARYNX
  - epithelium, toxicity, nitrosamine derivatives, hamster: 2039
- NASOPHARYNX NEOPLASMS
  - EB virus particles: 1593,2106
  - epidemiology
    - dogs and cats, Germany (Munich): 869
    - India, carcinogen-contaminated foods: 959
    - Indonesia, smoking (including opium), ethnic groups: 1068
    - Mexico City: 2954
    - Nigeria: 1301
  - induction, nitrosohexamethyleneimine, rat: 271,1726
  - inverted papilloma and squamous cell carcinoma: 884
  - occupational, pilots of non-pressurized airplanes: 922
  - postnasal space carcinoma, serum EB virus antibodies: 2105
  - trace elements in soil, Kenya: 2927
  - tumor growth rate and survival rates: 1968
- NEOPLASMS, EXPERIMENTAL
  - adenovirus 12- or Rous sarcoma virus-induced, effect on adenovirus 12-induced tumors, mouse: 2088
  - ascites, immune tolerance induction: 212
  - B-16 melanoma (mouse), effect of environmental conditions (crowding or isolation): 1339
  - BHK 21/13 clone (hamster), effect of polyoma virus: 1130
  - blood and tissue cell counts, method: 1633
  - carcinoma Vx2 or Vx7 (rabbit; Shope virus-induced), relative malignancy: 358
  - cell growth kinetics, review: 1367
  - chemically induced, review: 217,236,907,2206
  - Cloudman S-91 melanoma (mouse), enhancement, chick embryo extract: 2185
  - comparison with human tumors, review: 1653
  - Dalton lymphoma (mouse), leukemogenesis by DNA and RNA: 532
  - DNA and RNA methylation, review: 1990
  - differentiation, effect of embryonic tissue, rat kidney tumor *in vitro*: 2956
    2956
- NEOPLASMS, EXPERIMENTAL (contd)
  - Ehrlich carcinoma (mouse)
    - antigen composition and karyotype after prolonged *in vitro* cultivation: 197
    - cell growth kinetics: 1652,1966,2696,2699
    - chromosome morphology after *in vitro* irradiation: 471
    - dimethylbenzanthracene binding to DNA, mechanism: 1240
    - effect of
      - antitumor agents or splenectomy: 195
      - connective tissue components, mouse: 292
      - filtered or unfiltered tobacco smoke: 1502
    - mixed with mammary tumor, mammary tumor virus propagation: 1835
    - stimulation by RNA: 513
    - transplantation immunity: 1445
  - Ehrlich-Lettré carcinoma (mouse), transplantation route and tumor virulence: 894
  - electron spin resonance spectra: 2477
  - enzyme release into culture medium, criterion of malignancy: 2975
  - fatty acid and glycerol ether metabolism, rat and mouse: 421
  - Fedex-WP tumor (rat), long-term culture, properties: 1346
  - Guérin carcinoma (rat), serum oncolytic activity: 949
  - HeLa cells, transplantation, chick embryo: 199
  - hyperplastic lesions and tumors, hybrid mouse: 263
  - immunity, review: 234,235,447,457,539,904
  - immunoglobulin-producing plasma cell tumors, karyotype, mouse: 1115
  - invasiveness *in vivo*, method of measurement: 2480
  - induced, aerobic and anaerobic glycolysis, comparison with embryonic cells *in vitro*, mouse: 2479
  - I.R.E. reticulum cell sarcoma (rat), stimulation, blood coagulation activator: 1760
  - JBK sarcoma (mouse), chromosomal DNA synthesis: 660
  - KB cells, RNA: 440
  - Krebs-II carcinoma (mouse), effect of environmental conditions (isolation or crowding): 1339
  - L-M fibrosarcoma (mouse), sex difference: 891
  - low- or high-malignancy, mouse or rat: 436, 437,438
  - mediation by hypothalamus, rat: 666
  - metastases, blood coagulation, review: 2219
    - effect of hemorrhagic shock, rat: 2198
  - mitochondrial DNA: 2180
  - Moloney sarcoma (mouse), effect of leukemia viruses: 577
    - ultrastructure: 1062
  - mouse embryo cell culture, effect of culture medium on transformation: 2188
  - mutant mouse lymphoma, DNA: 419
  - NTF reticulum cell sarcoma (mouse), Friend leukemia virus: 1811,1812
  - newborn and infant mice, review: 1130
  - Novikoff hepatoma (rat), effect of carcinogens on nucleolar RNA: 743

EOPLASMS, EXPERIMENTAL (contd)
- P4 *bis* (mouse), attenuation by leukemia virus: 1817
- plant, virus-induced, effect of tannic acid and ellagic acid: 990
- plasma cell tumors, pathogenesis, mouse, review: 459
- polyoma virus sensitivity, spontaneous or induced mouse tumors: 1568
- R-1 rhabdomyosarcoma (rat), radiation-induced, radiation effect on growth kinetics: 2700
- RNA metabolism, mouse: 439
- rat tumors, effect of mouse leukemia virus: 2346
- role of autoimmunity, review: 2740
- Rous sarcoma (rat), cirrhotic or non-cirrhotic liver: 1315
- Sanford 2472 fibrosarcoma (mouse), transplantation route and tumor virulence: 894
- sarcoma
  - incidence, effect of parity, agent-free mice: 180
  - induction
    - *in vitro* transformed mouse ovary cells, mouse: 2197
    - plastics or metals, mechanism, review: 2209
    - sheep RBC, mouse: 2491
- Sarcoma I (mouse), immunity: 2463
- Sarcoma 45 (rat), effect of dimethylbenzanthracene on mitosis *in vitro*: 945
- Sarcoma 180 (mouse)
  - chromosome morphology after *in vitro* irradiation: 471
  - effect of antitumor agents or splenectomy: 83,195
    - dibenzpyrene quinone: 67
  - mixed with mammary tumor, mammary tumor virus propagation: 1835
- Schmidt's Yoshida hepatoma (rat), inhibition by aflatoxin: 985
- Seidel hepatoma (rat), effect of ^{90}Sr: 476
- self-inhibition of growth, review: 2747
- spontaneous
  - effect of dietary trace elements, mouse or rat: 2291
  - epidemiology
    - beagles: 171
    - geographical variation, review: 230
    - pets and their owners: 163,644,1292,2163
  - fibrosarcoma, cat, virus isolation and transmission: 2071
  - hamster: 540
  - incidence, Sprague-Dawley rat: 1961
- SV40-induced, surface antigens: 2430
- transformed rat liver cell culture: 2187
- transplanted or autochthonous, immunity, mouse: 734
  - chondrosarcoma, hamster, properties: 1122
- urethan induction, rat: 948
- Vx2 carcinoma (rabbit), cortisone- and exercise-induced dissemination: 2051
- vaccine production and tumor induction, mouse or rat: 1868
- venereal, dog, cell line: 541
- virus- or chemically induced, tumor-specific surface agglutinin: 997

NEOPLASMS, EXPERIMENTAL: (contd)
- Walker 256 carcinosarcoma (rat)
  - karyotype: 874
  - stimulation, portal hypertension: 193
- Yoshida sarcoma (rat)
  - evidence of viral etiology: 2833
  - hormone stimulation: 761,762
  - and variants, karyotype: 872

NEOPLASMS, HUMAN (general and unspecified)
- ascites, immune tolerance induction: 212
- benign, malignant transformation, review: 252
- biochemical abnormalities, review: 1350
- cells
  - "antigen-shielding" substance: 2969
  - contact growth inhibition, species specificity: 893
  - effect of nonhuman viruses: 545
  - HeLa, transplantation, chick embryo: 199
  - HEp#2, karyotype: 659
    - latent genetic damage, radiation and temperature effect: 2714
  - membrane changes, review: 2756
- chromosome morphology: 184,186,416,1708,2719
  - review: 452,455,1693,2199,2513
- collagen diseases, pathogenesis: 2470
  - review: 2226
- diabetes mellitus: 616,1620,1621
- diagnostic method: 2726
- DNA and RNA methylation, review: 1990
- double or multiple primary: 191,214,389,1288, 1289,2136
- embryonic constituents, review: 188,688,2511
- epidemiology
  - Australia, blood groups (Gc): 637
  - Brazil (Recife Province): 636
  - Bulgaria: 2117
    - TB mortality: 867
  - calculation of relative risk, mathematical models: 2920
  - Canada, Ontario: 621
    - U.S. border areas: 622
  - children, review: 2217
  - Denmark: 624
  - East Germany: 2116
  - environmental carcinogens, review: 442,451, 470
  - France, alcoholism, air pollution and smoking: 2123
  - Great Britain (London), businessmen: 1086
  - Hungary, rural: 146
  - India, children: 2950
    - SV40 antibodies: 1279
  - Israel, appendectomy: 161
    - children, ethnic groups: 1286
  - Italy: 627,629,1322,2653
    - children: 628
  - Japan: 2448
  - Natal Africans: 1065
  - New York City, appendectomy: 1076
  - Nigeria (Lagos): 652
  - pets and their owners: 163,644,1292,2163
  - Poland: 855,1317,1924
    - bovine leukosis-enzootic farms: 1637
    - children, methods: 1285
  - Rumania, methods: 2115

- NEOPLASMS, HUMAN (contd.)
    - San Marino: 2654
    - Scotland: 1287
    - screening methods and results: 392
    - seasonal variations, Northern Hemisphere and Australia: 1925
    - South Vietnam (Saigon): 1066
    - trace elements in soil, water and food: 2118
    - tropical Africa, review: 1661
    - ulcerative colitis: 208
    - U.S.: 2454
        - Canadian border areas: 622
        - leprosy: 1107
        - males: 2455
    - USSR: 2119
    - West Germany (Düsseldorf): 854
        - blood groups: 1298
    - worldwide: 394,404,2112
        - sex difference: 2121,2122
    - Yugoslavia (Split): 2652
  - experimental models, review: 1653
  - genetics, review: 467,689,2225
  - growth kinetics: 1367,2701,2702,2957
  - heart metastases: 1299
  - herpes and herpes-type viruses: 771,1055,2104
  - high-risk groups, susceptibility to viral transformation of cells, review: 2213
  - Hodgkin's disease with multiple primary carcinomas: 889
  - immunity: 2460
    - review: 234,236,457,688,899,901,904,1350, 1351,1692,2199,2510
  - isoniazid treatment, children: 958
    - lupus vulgaris: 1724
  - liver metastases, effect of cirrhosis: 1315
  - LSD users, review: 2207
  - metastases, blood coagulation, review: 2219
  - multiple primary, "cancer family" syndrome: 1976
  - negative association with hay fever-type allergy or pregnancy sickness: 2461
  - occupational
    - asbestos, review: 1668
    - California: 158
    - chemists, U.S.: 2245
  - paraneoplastic dermatomyositis, case and review: 2471
  - perimodal variations of DNA content: 2974
  - personality patterns and neuroendocrine factors, review: 1660
  - pregnancy: 1090
  - prevention and control, review: 906
  - primary melanoma of rare sites, pathogenesis, review: 2745
  - risk period, review: 448
  - sarcoma, myxovirus isolation: 592
  - serodiagnosis, method: 408
  - serum γ-globulin antibodies: 2971
  - small intestine and second primary, incidence: 1289
  - tumor-specific antigens: 2722
  - viral etiology, review: 902,903,1358,1687, 1688,1689,2749,2750,2751
  - virus DNA, methods of determination: 2904
  - virus-like particles, comparison to mouse or cat leukemia viruses: 1874
- NERVOUS SYSTEM DISEASES
  - recurrent nerve paralysis, lung cancer: 383
- NERVOUS SYSTEM NEOPLASMS (See also under Brain neoplasms and Spinal cord neoplasms)
  - epidemiology
    - Canada (Ontario): 1300
    - worldwide: 2438
  - methylnitrosourea induction
    - rabbit: 1243
    - rat: 1241,1242,1728,2265,2266,2816
  - spontaneous, domestic animals, cases and review: 2694
- NEUROBLASTOMA
  - infant, congenital defects, case and review: 177
    - karyotype: 1340
  - prenatal: 386
- NICKEL
  - occupational exposure, lung cancer, Japan: 1932
  - respiratory cancer, review: 1669,2731
  - soil, nasopharynx cancer, Kenya: 2927
- NICKEL CARBONYL (Ni (CO)$_4$)
  - distribution, rat: 498
  - effect on RNA polymerase, rat liver: 1231
- NICOTINE (See also under Tobacco)
  - analysis, cigarette smoke, method: 2785
  - anthelmintic containing, esophagus tumors, sheep: 504
  - possible carcinogenesis, review: 1989
- NICOTINE METABOLITE
  - cotinin, toxicity, rat: 718
- NIOBIUM
  - trace levels, spontaneous tumor incidence, animal: 2291
- NITRATES
  - alkaline, effect on carcinogen content of tobacco smoke: 55
    - tobacco smoke carcinogenicity, mouse skin: 76
- NITRO COMPOUNDS
  - mammary tumors, rat: 267
  - structure-activity relationships, review: 2742
- 4-(5-NITRO-2-FURYL)THIAZOLE, 2-(2-FORMYLHYDRAZINO)- and derivatives, carcinogenesis, rat: 1470
- N-(4-[5-NITRO-2-FURYL]-2-THIAZOLYL)FORMAMIDE
  - urinary tract and mammary tumors, rat: 1471
- NITROGEN DIOXIDE
  - lung tumors, rat: 98
- NITROGEN MUSTARD (See under Antitumor agents)
- NITROGEN OXIDES
  - exposure, cancer incidence, Ohio (Cleveland): 2439
- 4-NITROQUINOLINE
  - effect on sea urchin embryo: 943
- NITROQUINOLINE DERIVATIVES
  - phage induction as index of carcinogenic activity: 1716
- 4-NITROQUINOLINE-1-OXIDE
  - charge transfer reaction with DNA: 2038
  - chromosome abnormalities and leukemogenesis, strain differences, mouse: 2037
  - derivatives
    - carcinogenesis and cell transformation *in vitro*, hamster: 273
    - mechanism of action, *Tetrahymena*: 2530

NITROQUINOLINE-1-OXIDE (contd.)
- s.c. tumors, structure-activity relationship, mouse: 2782
- 3- and 8-substituted, chemistry: 97
- effect on
  - mammalian cell lines: 2783
  - nucleolar RNA, tumor cells: 743,1404
  - RNA, mechanism, tumor cells: 2030
  - sea urchin embryo: 943
- free radical production, effect of DNA, aqueous soln.: 490
- interaction with thiamine, complex formation: 989
- g.i. and liver tumors, rat: 2567
- lung tumors
  - effect of aluminum compounds, mouse: 965
  - methylcholanthrene-treated rabbit: 1454
  - rabbit: 37
- metabolic breakdown, rat skin: 304
- metabolite (4-hydroxyaminoquinoline 1-oxide), mechanism of action, aqueous soln.: 2031
- mutagenesis, yeast: 2584
- skin tumors, DNA metabolism, mouse: 2287
- stomach tumors, effect of salivary gland removal, rat: 2568
- transformation, properties of transformed hamster embryo cell clones: 2784

-NITROQUINOLINE-1-OXIDE, 6-CHLORO-
- carcinogenesis and cell transformation *in vitro*, hamster: 273

-NITROQUINOLINE-1-OXIDE, 3-METHYL-
- carcinogenesis and cell transformation *in vitro*, hamster: 273

ITROSAMINE DERIVATIVES
- analysis
  - alcoholic beverages, Africa (Zambia): 960
  - foods, method: 1418
  - tobacco smoke, review: 8
- cyclic, liver tumors, mechanism of action, rat: 1762
- effect on nucleic acids and protein, rat liver: 1742
- mechanism of action, review: 223,1664
- spontaneous formation (from nitrites and secondary amines) in stomach, rat: 2569

ITROSAMINE, DI-n-BUTYL-
- liver and bladder tumors, guinea pig: 740

ITROSAMINE, DIETHYL-
- analysis, alcoholic beverages, Africa (Zambia): 960
- dose-response relationship, mouse: 1469
- effect on RNA methylation, rat liver: 2562
- g.i. tumors, rat: 2567
- inactivation of tissue-specific inhibitors *in vitro*: 2065
- kidney and liver tumors, swine: 2275
- liver tumors
  - cell line, monkey: 175
  - guinea pig: 422,423,1792
  - rat: 51,317,520,751,752,753,982,1428, 1739,2567
- mechanism of action, normal cells: 1713
- respiratory tumors, hamster: 1220
- toxicity, liver, rat: 981
  - nasal epithelium, hamster: 2039
- transplacental carcinogenesis, rat: 737

NITROSAMINE, DIETHYL- (contd.)
- rodent, review: 911

NITROSAMINE, DIMETHYL-
- DNA and RNA alkylation, rat: 1410
- effect on
  - normal cells: 980
  - nucleolus, rat or mouse liver: 29,521
  - ultrastructure, rat liver: 1746
- kidney tumors, rat: 88,768,2252,2554
- liver tumors
  - mouse: 1425,2066
  - rabbit: 2274
  - rat: 976,1790
  - trout: 296
- lung tumors, rat: 976
- metabolism, effect of other carcinogens, rat liver: 1423
- mutagenesis, bacterial infection, mouse, method: 2259
- toxicity,
  - liver, mink: 2798
    - rat: 983,2799
  - nasal epithelium, hamster: 2039

NITROSAMINE, METHYL-
- mutagenesis, *Drosophila*: 2261

NITROSAMINE, METHYLBUTYL-
- esophagus tumors, rat: 738

NITROSO COMPOUNDS
- structure-activity relationships, review: 2742

NITROSOANILINE DERIVATIVES
- teratogenesis, relationship to carcinogenesis, rat: 288

N-NITROSOANILINE, N-METHYL-
- esophagus tumors, rat: 1411

NITROSOBENZENE
- metabolism, guinea pig: 43

p-NITROSO-N,N-DIMETHYLANILINE
- g.i. and other tumors, rat: 1749

NITROSODIETHYLAMINE (See Nitrosamine, diethyl-)

2-NITROSOFLUORENE
- metabolism, guinea pig: 43
- skin or g.i. tumors, rat: 86

N-NITROSOFLUORENE, 2-AMINO-
- metabolism, guinea pig: 43

N-NITROSOGUANIDINE, N-METHYL-N'-NITRO-
- liver tumors, rat: 1431
- mutagenesis, bacteria: 2259,2774
  - *Drosophila*: 2773
- reaction with DNA and protein: 703,1714,2256
- stomach tumors, rat: 1431

N-NITROSOHEPTAMETHYLENEIMINE
- lung and g.i. tumors, rat: 2250

N-NITROSOHEXAMETHYLENEIMINE
- liver and other tumors, rat: 271,1726

1-NITROSO-2-IMIDAZOLIDINONE
- effect on nuclear ultrastructure, yeast: 706

N-NITROSOMORPHOLINE
- liver tumors, rat: 751,1743
- premalignant liver or kidney lesions, rat: 275,317

N-NITROSOOCTAMETHYLENEIMINE
- lung and g.i. tumors, rat: 2250

NITROSOPIPERAZINE, 1,4-DI-
- mechanism of action, normal cells: 1713

N-NITROSOSARCOSINE ETHYL ESTER
- esophagus tumors, liver RNA and enzymes, rat: 751

NITROSOUREA DERIVATIVES
- teratogenesis and carcinogenesis, rat: 288, 2781

N-NITROSOUREA, N-BUTYL-
- leukemia and g.i. tumors, rat: 2580

N-NITROSOUREA, N-ETHYL-
- effect on immunity, guinea pig: 2307
- teratogenesis and fetal skin carcinogenesis, swine: 2262
- transplacental CNS carcinogenesis and teratogenesis, rat and hamster: 1727

N-NITROSOUREA, N-METHYL-
- brain and other tumors, rabbit: 1243
- CNS and peripheral nerve tumors, rat: 280, 1241,1242,1728,2264,2265,2266,2816
- DNA and RNA alkylation, rat: 1410
- effect on transformed or non-transformed cell lines: 712
- g.i. tumors, rat: 2049,2266
- kidney tumors, rat: 321,2049
- leukemia and lymphoma, rat or mouse: 321, 1500,2266
- lung tumors, mouse: 321
- mechanism of action, bacteria: 944
  - normal cells: 1713
- metabolism, rat: 1400
- skin and other tumors, rat: 2049
- stomach or pancreas tumors, guinea pig: 741

NITROSOUREA, PHENYL-
- connective tissue tumors, rat: 90

N-NITROSOURETHAN, N-ETHYL-
- g.i. tumors, rat: 49
- mechanism of action, normal cells: 1713

N-NITROSOURETHAN, N-METHYL-
- g.i. tumors, rat: 49
- lung and other tumors, mouse: 2044
- mechanism of action, bacteria: 944
- mutagenesis, bacteria: 2775
  - *Drosophila*: 2261
- stomach or pancreas tumors, guinea pig: 741

NIVALENOL (*Fusarium nivale*)
- toxicity, mouse: 1184

NORETHYNODREL (17α-ethynyl-17-hydroxyestr[5,10]en-3-one)
- mammary tumors, mouse: 2814

NUCLEASES
- acid DNase, benzpyrene lung tumors, mouse: 2249
- DNase and RNase, distribution, Friend leukemia virus-infected mouse spleen: 2401
- DNA endonuclease, adenovirus 2- or 12-infected hamster cells: 2423

NUCLEIC ACIDS, DNA
- adenovirus-infected cells: 143,565,1549,2422, 2423,2614,2638,2640,2856,2914
- amino acid binding, spontaneous or induced animal tumors: 2184
- avian or mammalian, hybridization with Rous virus RNA: 2835
- carcinogen binding, mechanism: 681,704,1240, 1714,2032,2038,2063,2271,2332,2742
- chemical or thermal skin injury, mouse: 1730
- chromosomal synthesis, tumor cells: 660

NUCLEIC ACIDS, DNA (contd.)
- circularity and supercoiling, papovavirus: 2855
- complementarity to SV40 and cancervirus (papovavirus) DNA, transformed mouse and hamster cells: 2842,2843
- control of mRNA biosynthesis, normal cells: 2841
- dye binding, oral epithelium, smokers and nonsmokers: 52
- effect of
  - atmospheric $^{14}CO_2$: 2227
  - carcinogen-bound rat liver proteins *in vitro*: 2065
  - carcinogens: 35,36,317,736,944,945,1195, 1402,1406,1407,1408,1410,1430,1440, 1485,1486,1497,1664,1713,1730,1742,1745, 1762,1773,1789,2045,2059,2256,2281,2287, 2310
    - review: 223,444,681,1145,1363,1666, 1691,1990,2742
  - filtered cigarette smoke, mouse fibroblasts: 2311
- effect on free radical production by carcinogens, aqueous soln.: 490
- herpes-type virus-infected cells: 2622
- human and simian adenoviruses, properties: 352,999,1838,2836,2917
- index of tumor growth rate, human lymphoma: 176
  - mouse mammary tumor: 54
- leukemia-like content, WBC, infectious mononucleosis: 2387
- leukemogenesis, mouse: 532
- mammary tumor virus-infected cells: 1617
- mitochondrial, comparison, normal and tumor cells: 2180
- mouse leukemia or sarcoma virus-infected cells: 124,1513,1516,1517,1610,2401,2630, 2829
- mutant mouse tumor: 419
- nucleohistones, reaction with hydrocarbons, cell-free system: 491
- perimodal variations, human cancer cells: 2974
- polyoma virus
  - infected cells: 994,1355,1567,2379,2380, 2649
  - properties: 994,1849,1850,1853,1916,2650
  - transformed or tumor cells: 114,1848, 2214
- premalignant tumors, cervix (human): 2457
  - liver (rat): 1426
- radiation effects, review: 2202
  - induced thymoma, mouse: 1707
- repair defect, solar carcinogenesis, xeroderma pigmentosum: 1369
- replication, myeloid leukemia: 1986
- Rous sarcoma virus-infected or transformed cells: 825,1048,1518,1829,2357
- Shope fibroma virus-infected cells: 841,1585
- SV40
  - infected cells: 830,831,832,1582,1861, 2375,2647,2885,2890,2897
  - transformed or tumor cells: 114,1848, 2214,2433,2891

UCLEIC ACIDS, DNA (contd.)
 viral carcinogenesis, review: 1354,1355, 1363,2741
UCLEIC ACIDS, RNA
 adenovirus
  infected cells: 2638
  transformed cells: 2371
 analysis, tumor cells: 440
 avian myeloblastosis virus, properties: 801,1533,2395,2605,2821,2862,2863
 carcinogen binding, mechanism: 2271,2742
 cellular or leukemia virus, hybridization with SV40 DNA: 2897
 effect of
  atmospheric $^{14}CO_2$: 2227
  carcinogens: 35,36,261,284,736,743,751, 984,1404,1406,1410,1419,1420,1481,1485, 1486,1497,1713,1742,1781,2024,2030, 2059,2281,2299,2315,2562
   review: 444,1145,1363,1666,1691,2742
  estrogen, chick oviduct: 99
  filtered cigarette smoke, mouse fibroblasts: 2311
  hydroxyurea, normal tissues, mouse: 1195
 enzymes, adenovirus-induced hamster tumor: 349,2613
  effect of carcinogen, rat liver: 1231
 from induced hepatoma, induction of hepatoma, mouse: 2067
 helical polysomes, carcinogen induction, rat liver: 2563
 leukemia-like content, WBC, infectious mononucleosis: 2387
 leukemic human bone marrow, effect on normal cells: 553
 localization, bladder or prostate cancer and corresponding normal cells, human: 2697
 membrane-associated messenger RNA template (membron), cell genetics, hepatoma, review: 1155
 mengovirus-infected normal or tumor cells: 144
 messenger
  control by DNA, normal cells: 2841
  homology with adenovirus DNA: 2856
 metabolism, mouse tumor: 439
 methylation, normal and tumor cells: 2186
  tumor cells, review: 1990
 mouse leukemia virus-infected cells: 124, 532,1031,1032,1033,1253,1257,1516,1521, 1603,1877,2401,2630,2829,2861
  mammary tumor virus: 1615,1836
 nucleolar, effect of carcinogens, rat liver: 521,1741
  slowly or rapidly growing rat liver or hepatoma: 194,2177
 polyoma virus-infected or transformed cells: 2371,2379,2380
 properties, leukosis-sarcoma viruses: 2860
  rat liver and hepatoma: 2181,2487
  tumor viruses, review: 1354,1363,2741
 Rous sarcoma virus
  hybridization with avian or mammalian DNA: 2835
  properties: 826,1032,1257,2357
 Shope fibroma virus-infected cells: 1586

NUCLEIC ACIDS, RNA (contd.)
 SV40-infected or transformed cells: 114,1860, 2371,2372,2433,2897
 synthetic polymer, effect on virus leukemia or sarcoma, mouse: 1037,2410
 transfer, ethionine liver carcinogenesis, rat: 750,2061
  methylase, virus-induced liver tumor, chick: 2437
 tumor stimulation, mouse: 513
NUCLEUS
 benzpyrene distribution, normal cells: 2257
 unequal division, nitroquinoline carcinogens, Tetrahymena: 2530
NUCLEOLUS
 liver, effect of carcinogens, rat: 2062
NUCLEOPROTEINS
 spleen, elasticity, estradiol leukemogenesis, mouse: 1440
NUCLEOSIDES AND NUCLEOTIDES
 complex formation with carcinogens: 1182
 enzymes mobilizing, liver carcinogenesis, rat: 1738,1739,1761

OCCUPATIONAL DISEASES
 arsenic exposure
  lung cancer: 1478
  skin cancer: 2329
 asbestos exposure
  cancer risk, review: 14,1134,1162,1668
  mesothelioma: 915,962,1201,1202,1206,2541
  respiratory cancer: 507,536,963,1204, 1205,1207,2541
  smoking, Finland: 1208
 benzene exposure, erythroleukemia: 2579
 bladder cancer
  diagnosis: 961
  β-naphthylamine, rubber factory, England (Birmingham): 2937
  review: 2733
 bovine leukosis exposure
  cancer incidence, Poland: 1637
  leukemia incidence, review: 678
 cancer incidence
  California, union members: 158
  chemists, U.S.: 2245
 chromium exposure, lung cancer, Japan: 1932
 cotton cultivation, premalignant diseases of cervix, Kirghiz SSR: 2120
 dust inhalation, lung cancer, Japan: 715
 ear/nose/throat cancer, review: 1135
 glass components (including arsenic and chromium), nasal septum cancer: 1729
 industrial chemical exposure
  bladder and lung cancer, factory workers, Germany, smoking: 1455
  epoxy resin hardener and solvent, potential carcinogenic effects: 2807
  upper respiratory cancer, factory workers, Hungary: 1337,1937
 mineral exposure, lung and skin cancer, review: 2731
 mineral oil exposure, scrotal cancer, lathe operators: 508
 nasopharynx cancer, pilots of non-pressurized airplanes: 922

- OCCUPATIONAL DISEASES (contd.)
  - nickel exposure
    - lung cancer, Japan: 1932
      - review: 1669
  - pine pollen exposure (wood workers), Hodgkin's disease, geographical variation, U.S.: 2772
  - petroleum asphalt exposure, cancer risk: 169, 2540
  - radiation exposure
    - cancer risk, review: 1254
    - dosage levels, radiologists: 2757
    - ear/nose/throat cancer, review: 1135
    - leukemia, radiologists, review: 2203
    - radiation dosage, systemic radioisotope therapy, medical personnel: 2757
    - radiodermatitis, skin cancer, physicians: 1174
    - radium effects on WBC chromosomes: 925
    - uranium miners, lung cancer: 383,2231, 2495,2521,2522,2523,2524,2525
  - silicosis
    - lung cancer, Switzerland: 2246
    - mesothelioma: 2542
  - skin cancer
    - chemical, mechanical or thermal injury: 919
    - review: 2732
    - sun exposure, farmers or fishermen, Spain: 1175,1368
  - squamous metaplasia of bronchial epithelium, singers or wind instrument players: 2238
  - stomach cancer
    - England + Wales: 2440
    - Japan: 1932
  - tobacco cultivation or processing
    - premalignant diseases of cervix, Kirghiz SSR: 2120
    - upper respiratory cancer, Hungary: 1337, 1937
- OILS
  - heated s.c. sarcomas and other tumors, rat: 947
- OILS, EDIBLE
  - *Argemone mexicana*, carcinogen content: 959
- OILS, MINERAL (See also under Petroleum)
  - occupational exposure, scrotal cancer, lathe operators: 508
  - plasmacytoma, mouse: 315,557,1352,1441,1767, 2314
  - pulmonary scarring with lung cancer, human: 2247
- OILS, PLANT (See also under Croton oil)
  - citrus oils and components, effect on dibenzpyrene skin tumors, mouse: 2321
  - corn, lung and other tumors, mouse: 1788
  - spurge family (Euphorbiaceae), skin tumor promotion, mouse: 1199
- OIL YELLOW OB (See Naphthylamine, tolylazo-)
- OOPHORECTOMY (See under Endocrine ablation)
- OPIUM
  - smoking, nasopharynx cancer, Indonesia, ethnic groups: 1068
    - upper respiratory cancer, Cambodia: 862
- ORCHIECTOMY (See under Endocrine ablation)
- OROPHARYNGEAL NEOPLASMS
  - cytodiagnosis, review, book: 219
- OVARY
  - dimethylbenzanthracene toxicity, strain differences, mouse: 2284
  - function, rat with benign or malignant induced mammary tumor: 50
  - malignant transformation *in vitro*, sarcoma induction *in vivo*, mouse: 2197
  - polycystic, X chromosome morphology: 662
- OVARY NEOPLASMS
  - benign or malignant, sex chromatin: 2972
  - carcinogen-induced, epithelial-mesenchymal interactions, mouse: 2323
  - epidemiology
    - California (Oakland): 1089
    - Israel: 861
    - regional differences, Africa: 151
  - familial (mother and daughter): 895
  - human cell line (GW-127) karyotype and antigen production, hamster: 198
    - mechanism of adaptation to hamster, review: 13
  - incidence, partial hysterectomy: 895
  - induction
    - dimethylbenzanthracene, androgen-sterilized rat: 1434
      - fetal mouse: 2263
      - mouse: 954
    - estratriene derivatives, mouse: 85
    - methylcholanthrene, hormonal activity, pregnancy and lactation, rabbit: 2577
    - spontaneously transformed cell line, mouse: 2196
    - trimethylbenzanthracene, mouse: 954
  - intrasplenic ovarian graft, effect of endocrine ablation, rat: 1433
  - isolation of sarcoma virus, human: 1613
  - karyotype: 1109
  - mesonephroma, sex chromatin: 2717
  - radiation-induced
    - hormone effects, rat: 1756
    - pathogenesis, mouse: 254,934
  - teratoma (dermoid cyst), sex chromatin: 1988
- OXOLAMINE CITRATE
  - effect on cigarette smoke-induced ciliostasis, cat: 2787
- OXYGEN
  - effect on
    - liver carcinogenesis, mouse: 1459
    - neoplastic conversion, mouse embryo cells: 1168
  - high pressure, effect on radiation mammary carcinogenesis, rat: 481
- OXYGEN DEFICIENCY
  - stomach cancer, peptic ulcer: 480

- PANCREAS NEOPLASMS
  - carcinoma, simulating giant cell bone tumor: 210
  - chronic pancreatitis: 209
  - epidemiology
    - chemists, U.S.: 2245
    - Connecticut: 1080

NCREAS NEOPLASMS (contd.)
    smoking and diet: 1636
    USSR (Omsk): 2676
  induction
    3-hydroxykynurenine, mouse: 87
    methylbutylnitrosamine, rat: 738
    methylnitrosourea, guinea pig: 741
    methylnitrosourethan, guinea pig: 741
    N-nitrosohexamethyleneimine, rat: 271
  islet cell, swine: 1070
PILLOMA VIRUS (See under Virus, papova)
RAFFIN
  skin tumors, inflammation, mouse: 1776
RANEOPLASTIC SYNDROMES
  dermatomyositis, case and review: 2471
  lanugo-type hypertrichosis, gallbladder cancer with liver metastases, case and review: 202
RASITIC DISEASES
  schistosomiasis
    bladder cancer, child: 2666
      Malagasy Republic (Majunga region): 2708
    effect on aminoazotoluene liver carcinogenesis, mouse: 2276
    malignant transformation (bladder cancer), diagnosis, urinary LDH: 2171
  Taenia liver cyst, transformation to hepatoma, rat: 2179
  Trichomonas vaginalis infection, cervix cancer: 2456
LGER-HUET ANOMALY
  benzene-induced acute leukemia: 489
nicillium statolonum EXTRACT (Statolon)
  effect on Friend virus leukemogenesis, mouse: 1878
NIS NEOPLASMS
  epidemiology
    India: 642,859
    Peru (Cuzco), ethnic groups (Indians): 2688
    Venezuela: 388
RITONEAL NEOPLASMS
  mesothelioma, asbestos exposure: 962,1201
  sarcoma, child, transmission (hamsters) by cell-free extract: 1011
    induction, hydroxylamine derivatives, rat: 1472
TROLEUM (See also under Oil, mineral)
  asphalt, occupational exposure, cancer incidence: 169,2540
  automobile exhaust, lead compounds in air: 1463
  crude or refined, benzpyrene levels: 707
  distillates, lung toxicity, rat: 1722
    skin cancer, review: 2732
  fractions, skin tumors, mouse and rabbit: 309
  processing plants, air pollution, benzpyrene, USSR: 1399
    water pollution, benzanthracene: 1398
  water contamination, esophagus cancer, Curacao: 1223
AGOCYTOSIS
  lung macrophages, effect of cigarette smoke and sulfhydryl agents, rabbit: 721

PHARYNX NEOPLASMS
  adenovirus antigens: 1842
  epidemiology, smoking, California: 2672
PHENACETIN
  addiction, kidney cancer, human: 1751
PHENALEN-1-ONE
  air pollution, analysis, method: 738
PHENOBARBITAL
  effect on naphthylamine metabolism, dog: 40
PHENYLBUTAZONE
  leukemia, child: 709
PHEOCHROMOCYTOMA
  with neurofibromatosis and thyroid cancer, possible hereditary chromaffin differentiation defect: 191,214
PHORBOL ESTERS (See under Croton oil)
PHOSPHOLIPIDS
  balance with cholesterol, relationship to tumor induction and growth, review: 11
  effect on methylcholanthrene carcinogenesis, mouse: 735
PHOSPHORUS
  analysis, human tumors: 2970
PITUITARY
  function, induced mammary tumors, rat: 50, 1436
  graft
    effect on dimethylbenzanthracene mammary carcinogenesis, rat: 283
      mammary gland and estrus cycle, mammary agent-positive or -free mouse: 179
  prolactin levels, effect of dimethylbenzanthracene, rat: 767
PITUITARY-HYPOTHALAMUS AXIS
  hyperfunction, and endometrial cancer: 1330
PITUITARY NEOPLASMS
  estrogen-induced, blood supply, rat: 511
  chromosomes, male rat: 2304
    hormonal activity, rat: 2303
  hybrid mouse strains: 1892
  induction
    ^{131}I, rat: 1377
    urethan, rat: 259
  MtT/F4 mammotropic, effect on hydroxyfluorenylacetamide liver tumors, rat: 2801
  with other tumors, mechanism, human: 334
PLANT NEOPLASMS
  Agrobacterium tumefaciens-induced, effect of mineral deficiency, tomato plants: 1180
    stimulation by alkaloid: 529
  virus-induced, effect of tannic and ellagic acids: 990
PLANTS AND PLANT EXTRACTS (See also under Oils, plant and Tobacco)
  bracken fern (*Pteris aquilina*)
    bladder tumors, cattle: 1222
    g.i. tumors, rat: 1222
    mechanism of action, review: 1147
  food, carcinogen content, review: 1143
  medicinal
    carcinogen content, review: 1143
    esophagus cancer, Curacao: 1223,1224
      South Africa (Transkei): 1219
  pokeweed mitogen, effect on adenovirus carcinogenesis, hamster: 1559

PLANTS AND PLANT EXTRACTS (contd.)
- poppy-fumaria family, carcinogen production: 959
- range species, bladder tumors, cattle, Kenya: 2161
- spurge family (Euphorbiaceae), cocarcinogenic fractions: 1199,2527

PLASMA CELL TUMORS (See under Myeloma and related diseases)

PLASTICS
- commercial polyethylene, effect on benzpyrene skin carcinogenesis, mouse: 1733
- fibrosarcoma, transplantation antigens, mouse: 311
- polymethylacrylate (lucite), foreign-body reaction, chondrosarcoma of lung, human: 2005
- s.c. tumors, mouse: 732
  - rat: 1493,1494,2560
    - mechanism, review: 2209

PLEURA
- asbestos toxicity, occupational: 507,535

PLEURAL EFFUSIONS
- malignant tumors, Austria (Vienna): 2933

PLEURAL NEOPLASMS
- mesothelioma, asbestos exposure: 507,1201,1202,1203,1204,1206,2541
    - review: 14,915,1162
  - silicosis, human and animal: 2542

PODOPHYLLIN DERIVATIVES
- effect on benzpyrene cervicitis, hamster: 2576

POLYMERS
- cationic, effect on SV-15 adenovirus *in vitro*: 140
- organic, "solid-stage" carcinogenesis, review: 1140

POLYOMA VIRUS (See under Virus, papova)

PONCEAU MX (See 2-Naphtho-3,6-disulfonic acid, 1-(2,4-xylylazo)-, disodium salt)

POTASSIUM
- analysis, human tumors: 2970

PREGNANCY
- breast cancer incidence, Northern Ireland: 2152
- effect on hormonally active induced ovary tumors, rabbit: 2577
- human, Caesarean section, women with or without breast cancer: 1077
  - cancer incidence: 1090
- immune reaction to fetal cells, negative association with cancer: 2461
- lasiocarpine hepatotoxicity, effect of dietary lipotropes, rat: 1233
- mammary gland chromosomes *in vitro*, mouse: 185
- maternal-fetal transmission
  - choriocarcinoma: 668
  - leukemia virus or antibodies, mouse: 1028,1029,1030,2337,2338,2865
- parity, breast cancer, Peru (Arequipa): 619
  - spontaneous mammary tumors, mouse: 180,657
- placental benzpyrene hydroxylase and aminoazo dye N-demethylase, smoking, rat and human: 2539

PREGNANCY (contd.)
- postpartum regression of dimethylbenzanthracene-induced mammary tumors, lysosomal enzymes, rat: 2573
- pseudo-, mammary carcinogenesis, mouse: 760
- transplacental carcinogenesis
  - diethylnitrosamine, rat: 737
    - rodent, review: 911
  - dimethylbenzanthracene, mouse: 2263
  - ethylnitrosourea, swine: 2262
- wastage, childhood leukemia: 864

PRISTANE (See under Hydrocarbons, aliphatic)

β-PROPIOLACTONE
- skin tumors, mouse: 1195,2287

PROPIOPHENONE, p-HYDROXY
- effect on m-toluenediamine liver carcinogenesis, rat: 2277

PROPYL GALLATE
- effect on benzpyrene tumors, mouse: 730,1447

PROPHYLTHIOURACIL
- effect on methylcholanthrene mammary carcinogenesis, rat: 262

PROSTATE
- cultures, transformation by skin carcinogens, mouse: 2811
- effect of
  - androgens, mechanism, rat: 435
  - methylcholanthrene and actinomycin *in vitro*, rat: 2024

PROSTATE NEOPLASMS
- associated hormone-dependent and hormone-independent tumors of other sites, case: 2952
- CNS metastases, frequency: 2656
- epidemiology
  - Africa, circulating estrogens: 1087
  - Rhodesia (Africans): 1087
  - Texas (Houston), aged: 2689
  - worldwide: 2112
- induction
  - methylcholanthrene, hormone effects, rat: 766
  - single-cell culture, methylcholanthrene, mouse: 1771
- myocardial infarct: 1290
- pathogenesis: 671,1319
- RNA localization, comparison to normal tissue, human: 2697
- zinc binding, mechanism: 1647

PROTEINS
- carcinogen binding, mechanism, review: 2742
- effect of aflatoxins and nitrosamines, rat liver: 1742
- leukemia-like content, WBC, infectious mononucleosis: 2387
- nuclear, effect of azo dye carcinogen, rat liver: 1237,1238
- reaction with carcinogens, cell-free system: 703,1430,1714
- serum, aflatoxin-poisoned ducklings: 1794
- synthesis, mengovirus-infected normal or tumor cells: 144

PSYCHOLOGICAL FACTORS
- personality patterns and neuroendocrine factors, human cancer, review: 1660

YCHOLOGICAL FACTORS (contd.)
  stress, lip or tongue cancer: 672
RENE
  analysis, rubber dust: 57
  mutagenesis, yeast: 2258
  reaction with nucleohistones, cell-free system: 491
RROLIZIDINE ALKALOIDS (See also Lasiocarpine)
  liver toxicity and tumors, review: 1148
  mechanism of action, rat liver mitochondria: 1747
  structure-activity relationships, review: 2498

INALDIC ACID DERIVATIVES (tryptophan meta-
lites)
  bladder tumors, mouse: 2550
INOLINE DERIVATIVES (See also under Nitro-
inoline)
  charge transfer reaction with DNA as index of carcinogenicity: 2038
  neoplastic transformation, hamster embryonic cells: 273
INOLINE, 4-AMINO-, 1-OXIDE
  neoplastic transformation, hamster embryonic cells: 273
INOLINE, 4-HYDROXYAMINO-, 1-OXIDE
  diacetyl derivative, reactivity with nucleic acids: 1406
  free radical production, effect of DNA, aqueous soln.: 490
  neoplastic transformation, hamster embryonic cells: 273
  mechanism of action, aqueous soln.: 2031
  skin tumors, effect of dimethylbenzanthracene or dimethyl sulfoxide, mouse: 2558
  stomach tumors, mouse: 2566
INOLINE-1-OXIDE DERIVATIVES
  s.c. tumors, structure-activity relationship, mouse: 2782

DIATION
  dosage, systemic radioisotope therapy, medical personnel: 2757
  induced epidermal hyperplasia, cell growth kinetics, guinea pig: 2014
  scanning, animal and human, apparatus and methods: 1384
  sensitivity (photodermatosis), with mycosis fungoides, human: 2008
  solar, defective absorption, skin cancer: 2520
  toxicity, radioisotope aerosols, animal: 1371,1396
DIATION CARCINOGENESIS, EXPERIMENTAL
  atmospheric $^{14}CO_2$, testing method, mouse: 2227
  bone
    dog: 1371,1376
    hamster: 1379
    mouse or rat: 479,485,698
    species difference, rodent: 933
    virus isolation, mouse: 931
  effect of
    diet, mouse: 1396,2012

RADIATION CARCINOGENESIS EXPERIMENTAL (contd.)
    hormones, mouse, review: 1695
  esophagus, mouse: 932
    species difference, rodent: 933
  ^{131}I, thyroid and pituitary, rat: 1377
  kidney, effect of radioprotective agent, rat: 2759
  lung
    effect of dimethylbenzanthracene, rat or hamster: 2011
    mathematical model: 1696
    rat: 1378
  review: 683,1136
    species difference, rodent: 933
  mammary
    monkey: 2515
    rat: 481,1705,2761
      virus-like particles, rat: 2085
  ovary
    effect of hormones, rat: 1756
    pathogenesis, mouse: 254,934
  possible, spontaneous nasopharynx cancer, dogs (Germany): 869
  review: 222,241,445,912,917,2201,2496,2510
  screening methods, review: 1127
  skin
    mathematical model: 1696
    mouse: 472,1173,1711
      effect of dimethylbenzanthracene: 512
    rat: 936,2013
  soft tissue, effect of chelating agent, rat: 485
  ^{90}Sr, pituitary-adrenal or thyroid function, rat: 476,2228
  UV-induced malignant transformation, rat or mouse embryonic cells: 2758
RADIATION CARCINOGENESIS, HUMAN
  bone
    child: 930,2762
    fibrosarcoma: 1165
  brain (meningioma), radium: 257
  breast cancer, male: 475
  complications of radiotherapy for cancer, child: 484
  hand: 2765
  Hiroshima and Nagasaki
    breast cancer: 474
    lung cancer, smoking: 1176
    thyroid cancer: 1163
  juvenile papilloma of larynx to carcinoma, child: 1166,2763
  larynx carcinoma, after radiotherapy of sarcoma of larynx: 2232
  mouth cancer: 1216
    smoking: 506
  occupational
    ear/nose/throat cancer, review: 1135
    lung cancer, uranium miners: 2231,2495, 2521,2522,2523,2524,2525
  radium salts, sphenoid sinus carcinoma: 24
  review: 222,241,917,1254,2201
  risk, retinoblastoma treated with radiotherapy, children: 2009
  skin: 23,256,486,919,929,1164,1174,1175, 2233,2234,2235,2236,2765
    benign facial tumor with Peutz-Jeger syndrome and cervix cancer: 2169

RADIATION CARCINOGENESIS, HUMAN (contd.)
    fibrosarcoma: 2516
    occupational, physicians: 1174
      review: 2732
    premalignant lesions, review: 2729
    radon-contaminated gold ring: 23
    sunlight: 919,929,2235,2469
      albinism: 929
      Australia, UV content of sunlight: 1703,2764
      farmers or fishermen, Spain: 1175,1368
      Florida: 160
      Japan: 1305
      melanoma, prognosis: 2007
      porokeratosis, malignant transformation: 1333
      Uganda (Africans): 253
      vaccination scar: 19
      xeroderma pigmentosum: 1369,2173
  skull or scalp: 2233
  stomach cancer: 473
  thorium (Thorotrast; ^{232}Th)
    liver cancer: 1935
    multiple hemangioendothelial sarcoma: 2244
    mycosis fungoides, terminal reticulum cell sarcoma: 18
  thyroid cancer: 1163,2010,2690
    children and adolescents: 1178
    neurofibromatosis with malignant transformation (neurogenic sarcoma) and brain tumor: 2018
    review: 682
  uterus cancer: 2760
RADIATION EFFECTS
  benzpyrene-induced liver enzymes, rat: 742
  DNA, review: 2202
  erythroleukemia virus sensitivity, chick: 1171
  hamster liver: 1385
  human or simian adenoviruses: 565,2418,2639,2893
  mammary tumor, agent-positive or agent-free mouse: 136
  mouse leukemia viruses: 2598,2822,2823
  normal cells: 16,17,1582,2699
    interaction with sulfur mustard: 26
  polyoma virus tumors, hamster: 2848
  radiation-induced leukemia, age and strain influences, rat: 1383
    sarcoma, rat: 2700
  serum oncolytic activity, tumor-bearing rat: 949
  spontaneous leukemia incidence, rat: 2308
  SV40-transformed cells: 255,345,1582
  transplantation immunity, mouse tumors: 1445
  tumor cells: 471,1708,2699,2714
  WBC chromosomes, Hiroshima and Nagasaki: 25,926
RADIATION LEUKEMOGENESIS, EXPERIMENTAL
  hamster, virus-like particles: 1710
  leukemoid reaction, rat: 698
  monkey: 1172
  mouse: 696,1167,1498,1704,1706,1707
    assay of radiation leukemia-protective factor, mouse: 2517
    chromosomes, radiation chimera: 2243
RADIATION LEUKEMOGENESIS, EXPERIMENTAL (contd.)
    effect of
      diet: 2012
      radioprotective agent: 2759
      urethan: 2518,2519
    role of leukemia viruses and host factors: 2229
    virus production: 787,789,1170
  radioisotope aerosols, dog: 1371,1376
  review: 241,454
  swine, virus-like particles: 695
RADIATION LEUKEMOGENESIS, HUMAN
  child: 484,864
  erythromyeloid leukemia: 1397
  Hiroshima and Nagasaki: 1697,1698
  ^{131}I-treated thyroid diseases: 477,478
  ^{32}P-treated polycythemia vera: 2230
  review: 1254,2203
  radiation-treated breast cancer: 1699,1700
    cervix or uterine cancer: 20,1699
RADIOACTIVE ISOTOPES AND ELEMENTS
  aerosols
    distribution, animal: 1372,1373,1374,1380,1382,1390,1391,1392
    effect on adrenal function, dog: 1381
    lung tumors, rat: 1378
    toxicity, animal: 1372,1373,1374,1376,1378,1381
  atmospheric $^{14}CO_2$, biological testing (mice), apparatus and methods: 2227
  bone-seeking, mechanism of action, mouse: 931
  bone tumors, hamster or dog: 1371,1379
  carcinogenesis, rat: 1377,1378
  ^{137}Cs
    blood, geographical variations: 923
    lung tumors, rat: 1378
  distribution, animal: 1386,1387,1388,1389,1395
  ^{131}I, leukemogenesis, human: 477,478
  leukemia, dog: 1371
  metabolism, preparation and measurement of biological samples: 1393,1394
  ^{32}P, leukemogenesis, polycythemia vera: 2230
  ^{210}Po
    analysis, American tobacco: 21
    blood, smokers: 928
    toxicity, review: 9
  ^{238}Pu, fallout, analysis: 1179
  ^{239}Pu, bone and soft tissue tumors, rat: 485
  ^{226}Ra
    analysis, American tobacco: 21
      water supply, U.S.: 22
    occupational exposure, WBC chromosomes: 925
  radiation exposure levels, radiologists: 2757
  ^{90}Sr
    adrenocortical toxicity, rat or dog: 476,1381
    analysis, milk, Colorado: 697
    balance with calcium, human: 924
    bone tumors, mouse: 479
    effect on pituitary-adrenal and thyroid function, rat: 2228
      transplantable tumor, rat: 476
    leukemia, swine, virus-like particles: 695
    toxicity, rat: 935

DIOACTIVE ISOTOPES AND ELEMENTS (contd)
- ^{232}Th (Thorotrast), carcinogenesis, human: 18,1935,2244
- toxicity, hamster or dog: 1375,1379
- tritiated uridine, melanic tumors, *Drosophila*: 2268
- uranium mining
  - lung cancer, Czechoslovakia and U.S.: 2231, 2495,2521,2522
  - radiation dosage calculation: 2523,2524,2525
- ^{90}Y-^{90}Sr, leukemoid reaction and other tumors, rat: 698

DIOPROTECTIVE AGENTS
- effect on radiation carcinogenesis (rat kidney) or leukemogenesis (mouse): 2759

CTUM NEOPLASMS
- benign (polyps) and/or malignant (carcinoma), incidence: 612
- differential diagnosis: 412
- epidemiology
  - Argentina: 614
  - Canada (Manitoba), ethnic groups: 1308
  - East Germany: 2132
  - Israel, ethnic groups: 2138
  - Japan, environmental factors: 2137
- frequency of associated diseases: 2136
- premalignant or malignant, diagnosis and treatment: 1118
- rectocolitic polyps, malignant transformation: 876,896
- regional enteritis (Crohn's disease): 2172
- ulcerative colitis, risk, review: 1154

PRODUCTIVE ORGANS
- leukemia virus transmission, mouse: 366

SPIRATORY TRACT
- carcinogen distribution, hamster: 717
- epithelium, effect of tobacco smoke, dog or cat: 71,72
- toxicity, ^{210}Po, review: 9
  - tobacco smoke, aerosol and volatile constituents, review: 7

SPIRATORY TRACT CARCINOGENESIS
- animal, review: 1136
- asbestos, review: 1134
- diethylnitrosamine, hamster: 1220
  - pregnant and fetal rodent, review: 911

SPIRATORY TRACT DISEASES
- epidemiology, air pollution, Chicago: 62

SPIRATORY TRACT NEOPLASMS
- cytodiagnosis, review (book): 219
- epidemiology
  - air pollution, U.S., urban: 2674,2932
  - Cambodia: 862
  - Czechoslovakia: 390
  - San Marino, comparison to Italy: 2654
  - Scotland: 148,1287
- papillomatosis, malignant transformation, smoking: 972
- plasmacytoma, epidemiology, Scotland (Aberdeen area): 148
- primary melanoma, pathogenesis, review: 2745
- smoking, review: 1153,1161

TICULOENDOTHELIAL NEOPLASMS
- Kaposi's sarcoma, complication of kidney graft rejection: 1646

RETICULOENDOTHELIAL SYSTEM
- function, effect of C57 leukemia virus, mouse: 2631,2632
  - rat with methylcholanthrene sarcoma: 2293
- zymosan stimulation, effect on ^{137}Cs deposition, rat lung: 1380

RETICULUM CELL SARCOMA (See under Lymphoma)

RETRORSINE
- effect on liver proteins, rat: 522

RIBOFLAVIN-5'-PHOSPHATE
- complex formation with carcinogens: 1182

RUBBER
- dust, polycyclic hydrocarbons, chemical analysis and monkey lung bioassay: 57
- manufacturing, bladder cancer, β-naphthylamine, England (Birmingham): 2937

SALIVARY GLAND
- hyperplasia-inducing factor, bioassay, mouse: 2175
- removal, effect on nitroquinoline oxide carcinogenesis, stomach, rat: 2568
- secretion, smoking, human: 967

SALIVARY GLAND NEOPLASMS
- associated Hodgkin's disease, skin tumors and stomach cancer: 889
- epidemiology
  - children, Washington (Seattle): 2929
  - Iowa: 1939
- induction, acetylaminofluorene, rat: 514
- mixed type, possible polyoma-like virus induction, human: 103
- polyoma virus-induced, ultrastructure, mouse: 1281

SARCOID, EQUINE
- immunity to bovine papilloma virus, horse: 138

SARCOIDOSIS
- with ulcerative colitis and cancer of ileum: 2195

SCAR TISSUE (See also under Injuries)
- achalasia of esophagus, malignant transformation, review: 2494
- bone, osteoma, review: 2728
- burns
  - methylcholanthrene skin carcinogenesis, mouse: 1169
  - nuclear DNA, mouse skin: 1730
  - skin cancer, human: 27,919,929,2016,2204
  - thumb, carcinoma of thumb, possible contact metastasis to ear: 2003
- chemical burns, esophagus cancer: 921,1370,2241
  - skin cancer, human: 919
- discoid lupus erythematosus, skin cancer: 2469
- dust particle uptake, rat lung: 1721
- electrical burn or surgery, skin sarcoma: 1306
- foreign body, meningioma, adolescent: 1701
- gastric stump, stomach cancer: 2002,2240,2769
- keloid-like, malignant transformation (fibrosarcoma): 2516
- larynx, larynx cancer, human: 1712
- lung
  - foreign-body reaction to plastic, chondrosarcoma of lung, human: 2005
  - malignant transformation: 482,1702,2239

SCAR TISSUE (See also under Injuries) (contd)
        TB, melanoma metastases: 2767
            scar cancer frequency: 2006,2768
    lupus vulgaris, spindle cell sarcoma: 2526
    melanoma, human: 918
    mineral oil fibrosis, lung cancer, human: 2247
    radiation-induced, malignant transformation (fibrosarcoma): 2516
    skin, premalignant or malignant tumors, review: 2729
    soft tissues, tumor metastases, lung or breast cancer: 2766
    tattoo, melanoma: 2017
    traumatic, skin carcinoma, human: 919,920,929
    unhealed varicose ulcer, "collision tumor" (skin and periosteum): 2004
    vaccination scar, skin cancer: 19,546,1369
SELENIUM
    analysis, human tumors: 2970
    effect on chemically induced skin tumors, mouse: 1778
SEX CHROMATIN
    acute leukemia, duplicate Y chromosome: 1348
    breast cancer: 1345,2716
    lung cancer, women: 417
    mesonephroma or colon cancer, women: 2717
    ovary tumors: 1988,2972
    premalignant or malignant female genital tumors: 2458
    trophoblastic tumors: 1110,1988,2193
    variations, estrus cycle, normal women: 871
    XO/XY mosaicism, gonadal tumors, review: 2509
SEX DIFFERENCE
    adenovirus tumors, hamster: 1561,1562
    cancer incidence, worldwide: 2121,2122
    dimethyl- or diethylnitrosamine hepatoma, rat: 982,1790,2066
    esophagus cancer, Wales: 2924
    fluorenylacetamide bladder or liver tumors, mouse: 2255
    Friend leukemia virus sensitivity, mouse: 1813
    Hodgkin's disease, worldwide: 2664
    hormone sensitivity, rat mammary tumor: 276
    hydroxyfluorenylacetamide metabolism, rat: 1764
    larynx cancer, Czechoslovakia: 384
    lung cancer: 2670
        with/without peptic ulcer, Austria: 396
    methylcholanthrene thyroiditis, rat: 2536,2780
    plasmacytoma, mouse, review: 1352
    stomach cancer, worldwide: 162
    SV40 tumors, hamster: 1562
    tumor growth rate (L-M sarcoma), mouse: 891
    urethan skin carcinogenesis, mouse: 1442
SILICATES (See also under Asbestos)
    soil levels, esophagus cancer, South Africa (Transkei): 1219
    "solid-state" carcinogenesis, review: 1140
SILICON
    pleural mesothelioma, animal and human: 2542
SILICOSIS
    lung cancer incidence, Switzerland: 2246
SKIN
    chemical or thermal injury, nuclear DNA, mouse: 1730
    cycasin metabolism, fetal and newborn rat: 724
SKIN (contd)
    DNA and RNA, effect of carcinogen, cocarcinogen or non-carcinogenic compound, mouse: 2281
    effect of tobacco smoke, mouse: 505
    hair follicles and sebaceous glands, role in skin carcinogenesis, mouse: 2283
    nitroquinoline-1-oxide breakdown, rat: 304
    non-specific irritation, mechanism, mouse: 1734
    saprophytic bacteria, carcinogen synthesis _in vitro_: 324
SKIN CARCINOGENESIS
    adenovirus-12, effect of adeno-associated virus, hamster: 1248
    anisole derivatives, guinea pig: 942
    antitumor agents, mouse or rat: 92,1491,2813
    arsenic, human: 725,1729,2329,2588,2731
    azuleno [5,6,7-cd]phenalene, mouse: 1495
    benzacridine derivatives, mouse: 728,959,1732
    benzanthracene derivatives, rat: 727,2033
    benzpyrene
        hamster cheek pouch: 274
        mouse: 60,729,730,731,1193,1443,1447,1733, 2555
        rat: 736
    bismuth subcarbonate, rat: 499
    bovine papilloma virus, calf: 1588,2851
        hamster: 993
    calcium chromate, rat: 2289
    chemical, virus-like particles, transplantation antigen, mouse: 2859
    cigarette smoke + dimethylbenzanthracene, method, mouse: 2023
    cocarcinogenesis, extracts from plants (family _Euphorbiaceae_), mouse: 1199,2527
    croton oil, mouse: 1497
    dibenzanthracene, mouse: 320
    dibenzpyrene, hamster or mouse: 67,1448,1451, 2321
    dimethylbenzanthracene
        guinea pig: 758
        hamster: 269,299,726,2285,2288,2556,2810, 2898
        mouse: 265,278,286,318,320,500,512,731, 739,1138,1194,1197,1199,1200,1209,1731, 1735,1778,2283,2284,2286,2287
        primate: 272,1191
        rabbit: 34
        rat: 277,512.2176,2478
    elaiomycin, rat: 2052
    estratriene derivatives, mouse: 85
    ethiodol, s.c. sarcoma, host immunity, mouse: 1192
    ethylnitrosourea, fetal swine: 2262
    food constituents, review: 1144
    heated dietary fats, rat: 947
    human pathogenic fungi, mouse: 1198
    hydroxyaminoquinoline oxide, effect of dimethylbenzanthracene or dimethyl sulfoxide, mouse: 2558
    hydroxykynurenine, mouse: 87
    hydroxyxanthine, DNA-bound amino acids, rat: 2184
    melanic tumors, tritiated uridine, _Drosophila_: 2268

SKIN CARCINOGENESIS (contd.)

- melanoma, virus induction, hamster: 1012
- methylcholanthrene
  - + croton oil, foot appendage, snail: 2267
  - mouse: 60,286,533,694,731,733,735,1169, 1192,1444,1446,1492,1496,1730,1734, 1778,2282,2294,2295,2296,2463,2557, 2559,2812
  - rat: 736,951,1190,1196,2292,2293
  - tumor immunity, guinea pig: 758
- mineral oil, occupational exposure, scrotum: 508
- β-naphthylamine or product, rat or mouse: 2552,2553
- nitroquinoline oxide and derivatives, hamster or mouse: 273,2287
- 2-nitrosofluorene, rat: 86
- nitrosomethylurea, rat: 2049
- occupational, review: 2732
- paraffin + dimethylbenzanthracene, inflammation, mouse: 1776
- petroleum and fractions, mouse and rabbit: 309
- plastic implants, rat or mouse: 732,1493, 1494,2560
- polycyclic aromatic hydrocarbons, relation to prostate cell culture transformation, mouse: 2811
- polyoma virus
  - benign s.c. tumors, rabbit: 2381,2899
    - + fluorenylacetamide, rat: 2309
- β-propiolactone, DNA inhibition, mouse: 2287
- quinoline-1-oxide derivatives, s.c. tumors, structure-activity relationship, mouse: 2782
- radiation
  - human: 23,256,486,919,929,1164,1174,1175, 2169,2233,2234,2235,2236,2516,2729,2732, 2765
  - mouse: 472,512,1173,1711
  - rat: 936,2013
- radioactive particles, mathematical model: 1696
- Shope papilloma virus, rabbit: 1587
  - spontaneous regression, rat: 2425
- steroids, structure-activity relationship, mouse: 1449
- sunlight, human: 19,160,253,919,929,1175, 1305,1333,1368,1369,1703,2007,2173,2235, 2469,2764
- SV40, effect of adenovirus type 16, hamster: 2898
- tars, historical review: 1362
- tobacco and products, animal: 6,66,76,270, 308,313,1131,1132,1501
- urethan, mouse: 301,302,1442,1736,2282,2287
- vitamin A palmitate, atypia, hamster cheek pouch: 1450
- Yaba virus (histiocytoma), monkey: 1063,1064, 1507

SKIN DISEASES

- albinism, skin cancer: 929
- chromoblastomycosis, malignant transformation: 881
- familial xeroderma pigmentosum, malignant transformation, sun exposure: 1369,2173

SKIN DISEASES (contd.)

- hereditary epidermodysplasia verruciformis, malignant transformation, possible role of virus: 2965
- ichthyosis, tongue cancer, child: 2467
- lupus vulgaris, cancer incidence and isoniazid therapy: 1724
- Mibelli's porokeratosis, malignant transformation: 1333
- neurofibromatosis, malignant transformation: 1640,2018,2727
  - multiple-tumor syndrome, hereditary chromaffin differentiation defect: 191,214
- osteomyelitic fistula, malignant transformation: 1123
- phagedenic and other ulcers, malignant transformation, Uganda (Africans): 253
- photodermatosis, malignant transformation (mycosis fungoides): 2008
- radiation-induced hyperplasia, cell growth kinetics, guinea pig: 2014
- varicose ulcer, "collision tumor" (skin cancer and periosteal fibrosarcoma): 2004
  - melanosarcoma: 880

SKIN NEOPLASMS

- arsenic-induced, pathology, human: 289
- benign
  - cervix cancer as possible complication of radiotherapy, Peutz-Jeger syndrome: 2169
  - epidemiology, offspring of women with breast cancer: 1953
- Bowen's disease, virus-like particles: 1894
- bowenoid carcinoma, hereditary epidermodysplasia verruciformis, possible role of virus: 2965
- brothers with chronic leukemia: 1126
- "collision tumor" with fibrosarcoma of periosteum, unhealed varicose ulcer: 2004
- congenital regressing and maturing neuroblastoma, siblings: 2468
- defective absorption of sunlight, human: 2520
- digital fibrous tumors, virus isolation, child: 2903
- discoid lupus erythematosus scar: 2469
- epidemiology
  - Australia, UV levels in sunlight: 1703,2764
  - Canary Islands (Tenerife), climate: 2126
  - Colorado, comparison with Japan: 1305
  - diabetes mellitus: 616
  - Florida, sun exposure: 160
  - Hong Kong and New Zealand: 625
  - India (Calcutta): 929
  - Israel (northern): 1627
  - Italy (Trieste): 2653
  - Japan, skin pigmentation and sun exposure: 1305
  - Poland: 1924
  - Spain, sun exposure, farmers or fishermen: 1175,1368
  - review: 443
  - USSR, regional variations: 2119
- esophageal skin-tube prosthesis: 415
- face, hormone-dependent tumors of other sites, case: 2952

- SKIN NEOPLASMS (contd.)
  - familial nevoid basal cell carcinoma syndrome: 1323,1324,1325,2466
  - histiocytoma (benign)
    - epidemiology, dogs, California: 1293
    - possible Yaba virus transmission by insect, monkey colony, New York: 2384
  - isoniazid-treated lupus vulgaris: 1724
  - keratoacanthoma, RNA-containing virus-like particles: 2818
  - malignant transformation
    - chromoblastomycosis: 881
    - Mibelli's porokeratosis: 1333
    - osteomyelitis with fistula: 1123
    - pilonidal sinus, case and review: 2966
    - scar tissue, human: 19,27,253,546,880,918, 919,920,929,1123,1306,1369,2003,2004, 2016,2017,2204,2469,2516,2526,2729,2966
  - melanoma
    - burn injuries, Uganda (Africans): 253
    - epidemiology, England (southwestern): 863
    - extension to TB scar of lung: 2767
    - familial: 888,918,2705
    - frequency of CNS metastases: 2656
    - genetic risk: 1323
    - marker chromosomes: 664
    - pigment-producing enzymes and karyotype, hamster: 205
    - prevalence: 2128
    - tattoo site: 2017
    - traumatized nevi: 918,2242,2705
  - melanosarcoma, varicose ulcer: 880
  - multiple
    - associated Hodgkin's disease and stomach cancer, immunology: 889
    - epidemiology, Poland (Gliwice): 1628
  - mycosis fungoides, photodermatosis: 2008
  - neuroma, with pheochromocytoma and thyroid carcinoma: 191,214
  - occupational petroleum asphalt exposure, U.S.: 2540
  - pre-existing diseases, African Negroes (Uganda): 253
  - premalignant
    - epidemiology, Kirghiz SSR: 2120
    - radiation-induced or scar tissue, review: 2729
  - radiation-induced, human: 23,256,486,919,929, 1164,1174,1175,2169,2233,2234,2235,2236, 2516,2729,2732,2765
    - scar or keloid-like disease, fibrosarcoma, human: 2516
  - sarcoma, incidence: 1306
  - spindle cell sarcoma, lupus vulgaris scar: 2526
  - spontaneous
    - epidemiology, USSR (Moscow), dogs: 2163
    - fish, Puget Sound: 402
    - papovavirus isolation, hamster: 2900
  - sun exposure: 19,160,253,919,929,1175,1305, 1333,1368,1369,1703,2007,2173,2235,2469, 2764
  - sun exposure, albinism: 929
    - xeroderma pigmentosum: 1369,2173
  - sweat gland nevi, pathogenesis: 2703
  - vaccination scar: 19,546
- SKULL NEOPLASMS
  - connective tissue type, review: 913
- SMOKING (See Tobacco smoking)
- SODIUM
  - analysis, human tumors: 2970
- SOIL
  - aflatoxin content, Israel: 1461
  - magnesium deficiency and acidity, leukemia endemic area, Poland, review: 2730
  - microelements, cancer distribution, review: 218
  - silica and other minerals, esophagus cancer, South Africa (Transkei): 1219
  - trace elements, cancer incidence: 2118
    - nasopharynx cancer, Kenya: 2927
- SPINAL CANAL NEOPLASMS
  - adenovirus induction, hamster or mouse: 1557,1558
- SPINAL CORD NEOPLASMS
  - dysembryoplastic, epidemiology, Rumania (Bucharest): 1947
  - epidemiology, Canada (Ontario): 1300
  - frequency, children: 2658
  - primary or metastatic, frequency, Mississippi, ethnic groups: 153
- SPINE
  - effect of methylcholanthrene, monkey: 1416
- SPLEEN
  - Δ-aminolevulinic acid synthetase, virus-induced polycythemia, mouse: 2597
  - antigenic component, benzidine-treated rat: 2535
  - effect of polyoma virus, mouse: 2427
  - mammary tumor virus propagation, mastectomized mouse: 133
- SPLEEN NEOPLASMS
  - induction
    - aminoazobenzene derivatives, hemangiopericytoma, rat: 38
    - antitumor agent (procarbazine), hemangioma, rat: 92
    - methylcholanthrene, sarcoma, immunity, mouse or rat: 2292,2295
- SPLENECTOMY
  - effect on
    - methyldimethylaminoazobenzene carcinogenesis, rat liver: 64
    - transplanted tumors, mouse: 195
- STATOLON (interferon inducer)
  - effect on mouse leukemia or sarcoma viruses *in vitro* or *in vivo*: 2079,2399
- STEROIDS (See under Hormones, steroid)
- STILBENE, 4-DIMETHYLAMINO-
  - ear duct tumors, growth kinetics, rat: 1965,2298,2299,2300
- STOMACH
  - abomasum, possible site of bovine leukosis virus invasion: 802
- STOMACH DISEASES
  - hypertrophic gastropathy (Menetrier's disease), malignant transformation: 2968
  - ulcer, lung cancer, sex difference, Austria: 396
    - malignant transformation: 480,879,897, 898,1630,2002,2240,2769

- MACH NEOPLASMS, EXPERIMENTAL
  - dietary and/or genetic factors, *Praomys (Mastomys) natalensis*: 645
  - induction
    - benzpyrene, mouse: 91,2050
    - dimethylbenzanthracene + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
    - fusel oil, rat: 316
    - hydroxyaminoquinoline oxide, mouse: 2566
    - methylnitrosourea, guinea pig: 741
    - methylnitrosourethan, guinea pig: 741
    - methylcholanthrene, method, rat: 1750
    - nitroquinoline oxide, effect of salivary gland removal, rat: 2568
      - + fluorenylenebisacetamide or nitrosodiethylamine, rat: 2567
    - nitrosobutylurea, rat: 2580
    - nitrosofluorene, rat: 86
    - nitrosoguanidine, rat: 1431
    - N-nitrosohexamethyleneimine, rat: 271
    - "spontaneously" formed nitrosamines in stomach, mechanism: 2569
- MACH NEOPLASMS, HUMAN
  - associated Hodgkin's disease and multiple skin tumors: 889
  - cell growth rates: 2449
  - epidemiology
    - ABH secretor status and ABO blood groups, review: 2744
    - ABO blood groups: 170,636,2135
    - Australia, environmental and socioeconomic factors: 1934
    - Bulgaria (Veliko Tirnovo district): 2133
    - Canada (Manitoba), ethnic groups: 1308
    - Czechoslovakia: 2114,2134
    - dietary factors, U.S. and Czechoslovakia, comparison: 2922
    - East Germany: 385,2132,2769
    - England + Wales, socioeconomic and occupational groups: 2440
    - Italy (Sulmona), aged: 2655
    - Japan: 2673
      - familial: 1078
      - mycotoxin production, fermented foods: 1230
      - smoking and occupation: 1932
    - Kenya (western): 2926
    - Mexico: 610
    - New York (Buffalo), air pollution, ethnic groups: 2674
    - Poland: 1924
    - review: 443
    - tumor risk and tumor histology, Mexico City and Colombia: 1933
    - Venezuela: 149
    - Wales, ethnic groups (Welsh and non-Welsh): 2925
    - worldwide: 2113
      - sex ratio: 162
  - etiology, review: 2501
  - "fetal" or "cancer" antigen: 1116
  - Hodgkin's disease, frequency: 2663
  - induction, radiotherapy of embryonal tumors: 473
  - liver metastasis, karyotype: 2459
- STOMACH NEOPLASMS, HUMAN (contd.)
  - lymphosarcoma, epidemiology, Finland: 1630
  - malignant transformation
    - Menetrier's hypertrophic gastropathy: 2968
    - peptic ulcer: 480,879,897,898,1630,2002, 2240,2769
  - muscular tumors, frequency, Cuba (Havana): 2921
  - postgastrectomy gastric stump: 897,898,2002, 2240
  - premalignant, epidemiology, Kirghiz SSR: 2120
- *Streptomyces hepaticus* METABOLITE (elaiomycin)
  - g.i., CNS and other tumors, rat: 2052
- SULFHYDRYL GROUPS
  - cysteine or glutathione, effect on alveolar macrophage response to tobacco smoke, rabbit: 721
- SULFUR MUSTARD
  - effect on
    - growth cycle, normal cells: 16,17
    - radiation damage, normal cells: 26
- SURGERY
  - appendectomy
    - breast cancer: 1077
    - cancer incidence (all tumors), Israel: 161
      - New York City: 1076
  - bursectomy, effect on Marek's disease, chicken: 818
  - Caesarean section, breast cancer: 1077
  - cholecystectomy, complications, cancer of cystic duct stump: 1334
  - cryogenic, effect on adenovirus-induced tumors, hamster: 835
  - gastrectomy (ulcer), stomach cancer: 897,898, 2002,2240
  - open-heart, complications, serum herpes-type virus antibodies: 2107
  - partial hysterectomy, ovarian tumor incidence: 895
- SV40 (See under Virus, papova)

- TANNIN COMPOUNDS
  - ellagic acid, effect on plant tumor virus: 990
  - tannic acid
    - effect on nucleolus, rat liver: 521
    - plant tumor virus: 990
- TARS
  - carcinogenesis, historical review: 1362
- TEMPERATURE
  - cold, effect on latent genetic damage, human cancer cells: 2714
  - environmental, effect on dimethylbenzanthracene mammary carcinogenesis, rat: 312
- TERATOGENESIS
  - cycasin aglycone, hamster: 1784
  - ethylnitrosourea, rat: 1727
    - swine: 2262
  - LSD, human, review: 2207
  - nitrosourea derivatives, rat: 2781
  - urethan, strain difference, mouse: 1466

TESTIS
- aflatoxin toxicity, monkey: 2269

TESTIS NEOPLASMS
- cadmium-induced, mouse or rat: 59,956
- epidemiology
  - Ceylon: 2159
  - South Africa (Cape Town), ethnic groups: 1952
- paratesticular sarcoma, epidemiology, Northern Ireland: 618
- radiotherapy, stomach cancer induction: 473
- reticulum cell sarcoma, with 2 hormone-dependent and 1 hormone-independent tumors of other sites, case: 2952
- seminoma, epidemiology, England + Wales, urban-rural difference: 2158
- spontaneous, hormone metabolism, rat: 955
- teratocarcinoma, trace element levels: 2970

TETRACENE
- photodimers, infrared spectra: 1245
- reaction with nucleohistones, cell-free system: 491

TETRACYCLINE
- mitochondrial fluorescence, normal, transformed or leukemic human lymphocytes: 2475

THALIDOMIDE
- effect on DMBA or hydrocortisone liver enzyme induction, rat: 527

THIAMINE
- effect on Friend virus leukemia, mouse: 367
- interaction with nitroquinoline oxide, complex formation: 989

THIAZOLE DERIVATIVES
- carcinogenesis, rat: 1470

THIOCYANATES
- saliva and urine, smoking, human: 968

THIOURACIL, METHYL-
- effect on acetylaminofluorene carcinogenesis, rat thyroid: 488

THYMINE
- effect on urethan or hydroxyurethan lung tumors, mouse: 2547

THYMECTOMY
- effect on Moloney (mouse) virus tumor induction, rat: 375

THYMUS
- effect on mammary virus carcinogenesis, mouse: 1547
- glycolysis, high- or low-leukemia mouse strains: 892
- leukemia antigen, differentiation, mouse embryo: 2712
- lymphoma induction, dimethylbenzanthracene, immunity, mouse: 278
- methylcholanthrene sarcoma, immunity, mouse: 2294
- radiation-induced atrophy, mouse: 696
- role in urethan + croton oil or methylcholanthrene skin carcinogenesis, mouse: 2282

THYMUS NEOPLASMS
- dimethylbenzanthracene-induced, immunity, mouse: 1186
- epidemiology, cattle, sheep and swine, Great Britain: 2162

THYMUS NEOPLASMS (contd.)
- induction, urethan + croton oil or anthracene derivative, mouse: 301

THYROID DISEASES
- goiter
  - breast cancer, USSR (Ukraine): 638
  - thyroid cancer, Colombia and Connecticut: 1303
    - Madagascar: 1943
    - review: 1152
- Hashimoto's thyroiditis, malignant transformation (lymphoma): 882
- hypothyroidism, breast cancer, review: 5
  - effect on dimethylbenzanthracene mammary carcinogenesis, rat: 1488,1779
- thyroiditis, methylcholanthrene induction, rat: 708,1196,2536,2780
- thyrotoxicosis, ^{131}I leukemogenesis, human: 477,478

THYROID NEOPLASMS
- associated hormone-dependent and hormone-independent tumors of other sites, case: 2952
  - pheochromocytoma and neuroma or neurofibromatosis, etiology: 191,214
- epidemiology
  - cattle, sheep and swine, Britain: 1070
  - children: 2661
  - dogs: 646
  - goiter, Madagascar: 1943
    - review: 1152
  - high-goiter (Colombia) or low-goiter areas (Connecticut): 1303
  - Hiroshima and Nagasaki: 1163
  - Michigan (Detroit): 2690
  - review: 682,1694
  - worldwide: 2112
- human, thyrocalcitonin and prostaglandin bioassay, non-infected and SV40-transformed cell culture: 2378
- induction
  - acetylaminofluorene + methylthiouracil, rat: 488
  - 3-hydroxykynurenine, mouse: 87
  - ^{131}I, rat: 1377
- virus-containing buffy coat cell line: 1806
- radiation-induced
  - adult: 2010
  - children and adolescents: 1178
  - neurofibromatosis with malignant transformation (neurogenic sarcoma) and brain tumor: 2018
  - review: 682
  - risk, retinoblastoma, child: 2009

TIN
- trace levels, spontaneous tumor incidence, animal: 2291

TISSUE EXTRACTS
- clam (*Mercenaria mercenaria*), effect on adenovirus tumors, hamster: 1004
- embryonic mouse skin, effect on methylcholanthrene or dimethylbenzanthracene skin carcinogenesis, mouse: 286

TOBACCO (See also under Nicotine)
- alkaloids, carcinogenesis, review: 1989
  - cotinin, toxicity, rat: 718

BACCO (contd.)
- analysis
  - aflatoxin: 78
  - arsenic, American cigarettes: 2537
  - ^{210}Po and ^{226}Ra: 21
  - tar content of smoke: 75
- carcinogenesis, review: 917,1131
- chewing
  - betel quid, oral mucosa pathology, Ceylon: 2124
  - gingival cancer: 501
  - mouth cancer, India: 973
  - oropharyngeal cancer, review: 1133
  - and snuff, mouth cancer: 1216
- esophagus cancer, South Africa (Transkei): 1219
- extract, effect on lysosomal membranes as index of cocarcinogenic effect: 1457
- genetics and farming or curing methods, effect on tar and nicotine content of smoke, U.S.: 74
- leaf extract, promotion of DMBA skin carcinogenesis, mouse: 66
- occupational exposure
  - premalignant lesions of cervix, agricultural workers, Kirghiz SSR: 2120
  - upper respiratory or ear/nose/throat cancer, factory workers, Hungary: 1337,1937
- potato virus infection, effect of tannic acid and ellagic acid: 990
- proposed standards for cigarettes: 65
- reconstituted, tar content of smoke: 75
- unburned, extracts, tumor-promoting effects, mouse skin: 1209,1501

BACCO SMOKE
- acrolein, mutagenesis, algae: 1720
- air pollution, measurement: 2786
- analysis
  - aflatoxin: 78
  - gas chromatography, methods and results, review: 2738
  - gas phase: 79
    - oily fraction: 719
  - α- and β-naphthylamine: 1456
  - nickel, review: 1669
  - nicotine, method: 2785
  - nitrosamine, review: 8
  - ^{210}Po, review: 9
  - tar: 76
    - reconstituted and natural-leaf tobacco: 75
  - U.S. and Canadian cigarettes: 2021
- carcinogenesis, review: 675,914,1132
- ciliostasis, effect of filtration and oxolamine citrate, cat: 2787
- condensates, method of preparation: 270,2022
- constituents
  - carcinogens, effect of sodium nitrate: 55
  - free radicals, possible relationship to carcinogenesis: 77
  - polycyclic hydrocarbons, isolation method: 84
  - tar, lymphoma, mouse: 722
    - relationship to cigarette consumption, U.S.: 69

TOBACCO SMOKE (contd.)
-
  -
    - and nicotine, variation by genetics, curing and farming methods, U.S.: 74
- dispensing apparatus, dog or rabbit: 1215,2248
- distribution, human lung preparation: 720,969
- effect on
  - alveolar macrophages, interaction with sulfhydryl agents *in vitro*, rabbit: 721
  - blood constituents, animal: 966
  - bronchial epithelium ultrastructure, dog: 1213
  - mitosis, mouse skin: 505
  - pulmonary defense mechanisms, guinea pig: 2788
  - salivation, human: 967
- filtered
  - effect on tumor cells *in vitro*: 1502
  - gas phase, induction of abnormal growth, mouse fibroblasts: 2311
  - or unfiltered, effect on enzymes, cell-free system: 1458
- filtration: 73,81,82
  - mechanisms, review: 4
  - nicotine reduction, review: 3
- nicotine-free extracts, effect on spontaneous or benzpyrene-induced tumors, mouse: 67
- skin tumors, rat or mouse: 6,66,76,308,313,2023
- toxicity
  - human bronchi: 970
  - lung, dog or cat: 71,72,1215
    - rabbit: 2538
    - rat: 2019
    - role of aerosol and volatile constituents, review: 7
  - mouse cell cultures: 2020

TOBACCO SMOKING
- appendectomy, cancer incidence, New York City: 1076
- biliary tract cancer, husband and wife: 1926
- bladder cancer
  - children and adolescents: 2666
  - Japan: 1927,1932
  - review: 2733
- bladder cancer, urinary tryptophan metabolites (chemiluminescence): 1221,2549
  - U.S.: 975
- blood carbon monoxide, smokers and nonsmokers, Los Angeles: 80
  - ^{210}Po: 928
- bronchogenic carcinoma *in situ*, screening of asymptomatic population: 2546
- bronchus cancer, brothers: 1343
- cancer incidence, France, study method: 2123
- ear/nose/throat cancer, Hungary: 1937
- effect on DNA-dependent dye binding by oral epithelium, human: 52
- esophagus cancer: 609,1065,1219,1635,1638,2132
- g.i. cancer, East Germany: 2132
- gingival cancer: 501
- habits, businessmen, London: 1086
- health hazards, review: 690
- heart disease, U.S. men: 68

TOBACCO SMOKING (contd.)
- inflammatory lung diseases, sputum cytology: 1210
- interstitial cell pneumonia, larynx cancer as possible complication: 190
- kidney cancer, U.S.: 975
- larynx cancer: 635,971,1081,1936,1975
- leukemia, U.S.: 975
- liver tumors, Japan: 1935
- lung cancer: 32,68,158,159,503,623,647,723, 975,1065,1085,1210,1211,1214,1246,1631, 1932,1959,2114,2125,2545,2668
  - asbestos exposure: 494,963,1668
  - familial lung disease, brothers: 1641
  - Hiroshima and Nagasaki: 927,1176
  - pulmonary tuberculosis: 1083,2768
  - review: 1,1153,1161,2205
  - smokers of filtered or unfiltered cigarettes: 70,502
  - treated peptic ulcer: 879
  - uranium miners, Czechoslovakia (Jáchymov): 2231
    - U.S., ethnic groups: 2522
- lung scar cancer: 482
- malignant transformation of respiratory papillomatosis: 972
- mouth cancer: 506,623,973,1084,2672
- nasopharynx cancer, Indonesia: 1068
- occupational asbestosis, Finland: 1208
  - lung and bladder cancer, chemical factory workers: 1455
- palate cancer, glucose-6-phosphate dehydrogenase deficiency, Italy (Sardinia): 2167
- pancreas cancer, Japan: 1636
- periodontal diseases: 974
- pharynx cancer: 506,2672
- photochemical repair, oral mucosa: 1709
- pipe tobacco, leukokeratosis and/or malignant tumors of mouth: 2789
- placental benzpyrene hydroxylase and aminoazo dye N-demethylase, human: 2539
- premalignant mouth lesions, Papua/New Guinea: 397
- relationship of cigarette consumption to tar rating, U.S.: 69
- school children, Illinois: 1218
- stomach cancer
  - Japan: 1932
  - Mexico: 610
  - peptic ulcer, Australia: 1934
- toxicity, cardiovascular, human: 1217
  - respiratory, review: 1161
- urinary and salivary thiocyanates, human: 968
- upper respiratory tract cancer, Hungary: 1937

α-TOCOPHEROL (See under Vitamins)

m-TOLUENEDIAMINE
- liver tumors, effect of other carcinogens, rat: 2277

TONGUE NEOPLASMS
- congenital skin defect (ichthyosis), child: 2467
- familial congenital telangiectatic erythema
  - and growth retardation (Bloom's syndrome): 2964

TONGUE NEOPLASMS (contd.)
- rare, classification: 1307

TOXICITY
- aflatoxins, animal: 1225,1740,1745,1794, 1795,2269,2585,2586,2790
  - review: 1149
- air pollutants, pulmonary defense mechanisms, guinea pig: 2788
- aminoazotoluene, liver, schistosomiasis, mouse: 2276
- 4-aminobiphenyl, dog: 764
- benzanthracene derivatives, rat or mouse: 954,2029,2033,2778
- carcinogenic or non-carcinogenic chemicals, review: 1663
- cycasin and its aglycone, mouse or rat: 1793
  - review: 1146
- diethylnitrosamine, hamster or rat: 98,2039
- dimethylaminoazobenzene, liver, effect of irradiated linolenic acid, rat: 2054
- dimethylbenzanthracene, adrenal, animal: 2313,2284,2777
- dimethylnitrosamine, animal: 2039,2798,2799
- dimethylbenzanthracene, mouse or rat: 1412,1413,1773,2041,2284
- fungi (from animal feeds or peanuts), rats and birds: 1229
- *Fusarium nivale* mycotoxin, mouse: 1184
- herbicides, animal: 764
- liver carcinogens, rat: 983
- lung carcinogens, mouse: 2045
- methylcholanthrene, monkey: 1785
- methyldimethylaminoazobenzene, liver, rat: 2805
- petroleum distillates, lung, rat: 1722
- pyrrolizidine alkaloids, liver, rat: 1233, 1747
  - review: 1148
- radioisotopes, dog: 1372,1373,1374,1375,1376
  - rat: 935,1378
- radiomimetic toxin(s) of bracken fern (*Pteris aquilina*), animal, review: 1147
- thioacetamide, liver, rat: 2800
- tobacco smoke
  - animal: 1215,2019,2538,2787,2788
  - human: 970,1217
  - mouse cell cultures: 2020
  - review: 1161
- tolylazonaphthylamine, liver, mouse or rat: 2794

TRACHEA
- effect of carcinogens *in vitro*, rat: 268,964

TRAUMA (See under Injuries or Scar tissue)

TRIAMCINOLONE
- effect on dimethylbenzanthracene tumors, hamster cheek pouch: 2556

TRIAZENE DERIVATIVES
- 1-aryl-3,3-dialkyl-, mechanism of action (CNS tumors), rat liver microsomes: 2059

TROPHOBLASTIC NEOPLASMS (See under Corpus uteri neoplasms)

TRYPTOPHAN
- cocarcinogenesis, bladder, dog: 1774
  - rat liver: 1428
- complex formation with carcinogens: 1182

RYPTOPHAN METABOLITES (See also under Anthranilic acid and Xanthurenic acid)
- bladder tumors, mouse: 2326,2550
  - review: 2733
- effect on human embryo cells: 2035,2529
- metabolism, mouse or rabbit: 2036,2327
- urinary, bladder cancer and smokers: 1221, 2549

URPENTINE
- skin irritation, mechanism, mouse: 1730,1734

REA, 3-(3,4-DICHLOROPHENYL)-1-METHOXY-1-METHYL- (Linuron; herbicide)
- toxicity, animal: 764

REA, HYDROXY-
- effect on nucleic acids, normal tissues, mouse: 1195
  - β-propiolactone skin tumors, mouse: 1195

REA (α-[2-METHYLHYDRAZINO]TOLUOYL)-
- mammary tumors, rat: 267

RETER NEOPLASMS
- cell growth rates and ploidy: 2451
- diabetes mellitus, human: 189
- epidemiology
  - "Balkan nephritis" areas, Yugoslavia: 1951
  - Norway: 1088

RETHAN
- brain and other tumors, rat: 259
- chromosome abnormalities, strain differences, mouse: 2037
- effect on DNA and RNA, cell-free system: 36
  - mouse: 35
- leukemia, mouse: 537,1498,2037,2306,2518, 2519
  - virus-like particles, mouse: 787,2305
- liver tumors, mouse: 1232,1736,2306
- rat: 260
- lung tumors, hamster: 2047
  - mouse: 285,322,716,1232,2044,2045,2306, 2547,2548
- mechanism of action, review: 2739
- multiple tumors, rat: 948
- skin tumors, mouse: 301,302,1442,1736,2282, 2287
- teratogenesis, strain difference, mouse: 1466

RETHAN, N-HYDROXY-
- lung tumors, effect of thymine, mouse: 2547
- mechanism of action, review: 2739

RIDINE
- tritiated, melanic tumors, Drosophila: 2268

RINARY TRACT NEOPLASMS
- cytodiagnosis, review (book): 219
- epidemiology, USSR (Leningrad): 639

TERUS NEOPLASMS (See under Corpus uteri neoplasms)

ACCINE
- BCG, effect on adenovirus 12-induced tumors, mouse: 2088
- poliovirus, serum SV40 antibodies, with or without leukemia: 1054,1857

AGINA
- effect of hormones and carcinogens, mouse, review: 1150

VAGINA (contd.)
- intrauterine contraceptive device, human: 2237

VAGINA NEOPLASMS
- epidemiology, Czechoslovakia (Brno): 643
- induction
  - methylcholanthrene, hormone effects, mouse: 2575
  - steroid hormones, mouse, review: 1361

VANADIUM PENTOXIDE
- reaction with carcinogens: 533

VASCULAR DISEASES
- varicose ulcer, malignant transformation (melanosarcoma): 880

VASCULAR NEOPLASMS
- glomangioma, hereditary (father and daughter): 887
- Rous sarcoma virus-induced, pathogenesis, chick embryo: 1046

VIRAL CARCINOGENESIS
- cell kinetics, mechanism: 1105
- defective viruses, review: 1655
- DNA-containing viruses, review: 1128,1658
- effect of hormones, mouse, review: 1695
- genetic control, review: 900
- hamster cell lines: 1844
- heteroploid cell lines, review: 1683,1684, 1685
- human, review: 456
- immunology, review: 447,538,901,903,1151
- interaction with carcinogens, review: 445
  - cocarcinogens, review: 1137
- latent viruses, detection methods, review: 1992,1993
- mammary tumor virus interference with leukemia virus, AKR mouse: 2612
- mechanism, review: 231,232,450,465,595, 684,691,903,916,1350,1353,1363,1364,1656, 1670,1690,2211,2514,2740,2741,2749,2750, 2751,2752
- nonhuman primates: 1921
- primary tissue culture cells, review: 1682
- RNA-containing viruses, review: 1658,2211
- role of late-replicating X chromosome, female genital cancer: 2718
- SV40, surface antigens, tumor cells: 2430
- tissue culture-derived vaccines, human, review: 1994,1995,1996
- transformation, cell membrane properties: 2394
  - mechanism, review: 2210
- vaccines from tumor-inducing cell lines, mouse or rat: 1868
- viral vaccines, review: 1657,1687,1688,1689

VIRUS
- arbovirus
  - effect on Shope virus fibroma, rabbit: 2623
  - Guaroa, interaction with mouse leukemia viruses: 572,1881,1883,1884
- avian tumor, ultrastructure and cytochemistry of aberrant forms: 121
- cell cultures, marker chromosomes, review: 1675
- contact inhibition, normal or carcinogen-transformed cells: 362

- VIRUS (contd.)
  - DNA-containing
    - human cancer, methods of determination: 2904
    - isolation, recurring digital fibrous tumors, child: 2903
    - particles resembling, canine mast cell tumor: 1867
    - properties of DNA and mechanism of transformation, review: 1354
  - detection, methods: 1919
  - diseases, leukemia risk, child: 864
  - flora, mammalian or avian tissue cultures, review: 1676,1677,1678,1679,1680
  - foot-and-mouth disease, serum reactivity as index of disease progression, human cancer: 547
  - H-1, effect on adenovirus-12 *in vitro* or *in vivo*, hamster: 1846,1905
  - hare tumor, isolation and properties: 2853
  - host resistance, histocompatibility, animal and human, review: 220
  - human and simian tissue cultures, review: 1681
  - identification method: 2624
  - influenza, infection, lung cancer, review: 683
  - isolation, mouse or human myeloma: 557
  - lactate dehydrogenase-elevating, synergism with antitumor enzyme, mouse leukemia: 1649
  - latent, detection, review: 1686
  - lymphocytic choriomeningitis, localization, method: 2388
  - melanoma, hamster: 1012
  - measles, tumor induction after *in vitro* propagation, hamster: 145
  - Newcastle disease
    - effect on Rauscher leukemia virus, mouse cells: 1876
    - RNA homology with avian myeloblastosis virus RNA: 2862
  - non-oncogenic
    - bovine rhinotracheitis or equine rhinopneumonitis, effect on human tumor cells: 545
    - detection of avian leukosis virus, chick embryo cells: 1534
    - effect on methylcholanthrene carcinogenesis, mouse: 1446
  - parainfluenza, RNA-associated nuclease: 2863
  - particles, induced skin tumors, transplantation antigen, mouse: 2859
  - particles resembling
    - induced brain tumors, mouse: 524,1452, 2854
      - lung tumors, mouse: 493
      - muscle tumors, mouse: 1452
    - Novikoff rat hepatoma: 2353
    - structure and function, human granulocytes: 102
    - transformed mouse cell lines: 2819
    - transplanted rat hepatoma: 1121
    - WBC, human cancer, review: 1358
  - plant
    - potato virus X, effect of tannic acid and ellagic acid, tobacco plant: 990
    - wound tumor, assay, method: 2625
      - structure, comparison to reovirus: 1923
  - plasma cell tumor, mouse, isolation and properties: 1013
  - polio or foot-and-mouth disease, particles resembling, spontaneous mammary tumor or lymphosarcoma, dog: 2830
    - resistance, effect of SV40, normal cells: 346
    - Sabin vaccine, serum SV40 antibodies, adults and children: 1054,1857
  - possible positive cells ("halo cells"), premalignant cervix lesion: 774
  - RNA-containing
    - particles resembling, human keratoacanthoma: 2818
      - methylcholanthrene-induced mouse brain tumor: 1872
    - properties of RNA, review: 1354
  - reo
    - isolation, Burkitt lymphoma: 2909
    - type 3, effect on Burkitt lymphoma cell lines: 1503
  - Sendai
    - Rous sarcoma virus induction and rescue, cell fusion method: 1535,2872
    - SV40 induction, cell fusion method: 2908
  - transformation, new mouse cell line: 361
  - transformed cell lines, effect of nitrosomethylurea: 712
  - vaccinia, skin cancer on vaccination scar: 19,546
  - vesicular stomatitis, sensitivity, SV40- or carcinogen-transformed cells: 2616
- VIRUS, ADENO- (See also Virus, hybrid)
  - antibody formation, primates and man: 594
  - bovine type 3, hamster and mouse tumors: 1565
  - CELO (chick embryo lethal orphan)
    - brain tumors, hamster: 2367
    - effect on SV40 tumors, hamster: 2844,2845
    - fibrosarcoma, hamster: 1566
    - specific tumor antigen, hamster tumor: 2637
    - tumor antigens: 1915
  - detection, human cancer, review: 902
  - DNA induction as index of tumor-inducing capacity, normal cells: 1549
  - hamster tumors, effect of shark serum: 1050
  - human
    - classification: 1838,2212,2915
    - properties of T antigens: 2892
    - subgroup C (types 1, 2, 5 and 6), properties: 1000
    - viral DNA homology with cellular messenger RNA: 2856
  - mechanism of tumor induction, review: 1353
  - replication, human embryo kidney cells: 139
  - review (book): 916
  - SA7 (simian)
    - brain tumors, hamster: 2366
    - DNA properties: 352,999,1838
    - effect of UV, hamster: 2418
    - hamster tumors: 352,1563, 1564,1845

RUS, ADENO- (contd.)

    - hybrid
        - human adenovirus type 2, properties: 141
        - type 12, properties: 142
    - immunization, SA7-induced tumors, hamster: 2417
    - reaction with adenovirus type 7, monkey cells: 2420
    - transformation, hamster cells: 354
    - transforming and plaque-forming capacity, radiation effects: 2893
- simian, classification: 355,1838,2212
- SV-15 (simian)
    - effect of cationic polymers *in vitro*: 140
        - phleomycin *in vitro*: 2092
- SV20 (simian)
    - hamster tumors: 1007,1563
    - transformation, hamster cells: 354
- SV30 (simian)
    - isolation, hamster tumor *in vitro* or *in vivo*: 348
- tumor cell lines, hamster: 567
        - morphology: 568
- transformation, mechanism, review: 1128
- transformed cells, tumor-specific surface agglutinin: 997
- type 1
    - hybrid with SV40 PARA genome: 2858
    - MONT strain (human lymphoma), transformation, rat embryo cells: 2368
    - transformation, rat cells: 2896
    - UV inactivation: 2639
- type 2
    - defective, growth pattern, monkey kidney cells: 112
    - effect of interferon, human cells: 2087
    - hybrid
        - simian adenovirus (SA7), properties: 141
        - SV40 PARA genome: 2858
    - nucleic acid and enzyme synthesis, cell lines: 2638
    - nucleotide sequences of viral genes, infected and transformed cells: 2884
    - reaction with SV40, monkey cells: 2424
    - replication, SV40-adenovirus 7 hybrid-transformed monkey kidney cells: 2839
    - "superinfection suppression," mechanism, transformed cells: 2857
    - transformation, rat cells: 2896
    - transformed cells, attempted induction of infectious virus production: 2615
        - tumor induction, antiserum-treated rat: 1001
    - viral DNA endonuclease, hamster cells: 2423
- type 3
    - replication, SV40-adenovirus 7 hybrid-transformed monkey kidney cells: 2839
    - transformation, rat cells: 2896
- type 4
    - effect on chromosomes, human embryo fibroblasts: 2912
- type 5
    - acetone-degraded particles, structure: 2198

VIRUS, ADENO- (contd.)

    - effect on SV40 tumor transplantation immunity, hamster: 2844
    - hybrid with SV40 PARA genome: 2858
    - interference with RNA and DNA virus, hamster cells: 2086
    - internal proteins, properties: 2916,2917
    - properties of DNA: 2836,2917
    - synthesis and properties of capsid proteins: 143,2419
    - viral and cellular DNA synthesis, hamster or human cells: 2614
- type 6
    - effect on chromosomes, human embryo fibroblasts: 2912
    - hybrid with SV40 PARA genome: 2858
- type 7
    - defective, growth pattern, monkey kidney cells: 112
    - effect on methylcholanthrene-transformed hamster embryo cells: 115
    - hamster tumors: 564,835
    - interferon effects, human cells: 2087
- LLE46 hybrid (SV40), surface antigens, transformed cells: 1864
    - LL strain SP2 hybrid (SV40), properties of transformed and tumor cells: 2839,2840
    - reaction with SV40 or simian adenovirus (SA7), monkey cells: 2420
    - SP2 hybrid (SV40), transformation, dog kidney cells: 2641
    - tumor vaccine preparation, hamster: 836
    - SV40 hybrid, properties of infected or transformed cells: 347,2373,2429
    - SV40 PARA genome hybrid: 2858
- type 12
    - antigens, human oropharynx cancer: 1842
    - cellular and viral DNA, hamster or human cells: 2422,2614,2640
    - classification of mutants: 1839,2837
    - CNS tumors, mouse: 1558
    - DNA replication, hamster cells: 2914
    - effect of
        - adeno-associated viruses, hamster: 566,1002,1003,1248,1917
        - clam extract, hamster tumor: 1004,2421
        - defective (H-1) and helper adenovirus, hamster cells: 1905
        - interferon, human cells: 2087
        - radiation, normal cells: 565
- effect on
    - host cell chromosomes: 351,2912
        - SV40 tumors, hamster: 2844,2845
    - genetic susceptibility to transformation, human fibroblast lines: 1840
    - hamster tumors: 110,111,349,350,1005,1552,1557,1559,1561,1562,1843,1846,2613
    - hybrid
        - simian adenovirus (SA7), properties: 142
        - SV40 PARA, transformation, SV40 antigens, hamster tumor: 1573
    - infected or transformed cells, effect on benzpyrene tumors, hamster: 2322
    - inhibition, BCG and allogeneic tumor cells, mouse: 2088

VIRUS, ADENO- (contd.)
  - karyotype of infected cells or hamster tumor: 1550,1551,1556,1841
  - nucleic acid and enzyme synthesis, cell lines: 2638
  - properties of DNA: 2836
  - T and V antigens, temperature dependence, normal cells: 353
  - transformed cells, properties: 1554,1555,1556,1903,2089,2369,2371,2373,2615,2839,2857,2894
  - tumor immunology: 350,1006,1551,1553,1560,1858,1904,2913
  - viral DNA endonuclease, hamster cells: 2423
- type 16
  - effect on DMBA or SV40 tumors, hamster: 2898
- type 18,
  - properties of DNA: 2836
  - T and V antigens, temperature dependence, normal cells: 353
- type 21
  - tumor induction, effect of thymectomy, hamster: 564
- type 31
  - effect on SV40 tumors, hamster: 2844,2845
  - hamster tumor, properties of tumor antigen: 2370
  - nucleic acid and enzyme synthesis, cell lines: 2638
  - properties of antigens: 1249,2838
  - T and V antigens, temperature dependence, normal cells: 353

VIRUS, HERPES
- antibody titers, monkeys and man: 543
- cytomegalovirus, incidence, monkey kidney cells: 2385
- effect of phleomycin *in vitro*: 2092
- infection
  - human cancer: 771
  - kidney graft, lymphoma or Kaposi's sarcoma complicating immunosuppressive therapy, human: 1646,1800
- simplex
  - attempted rescue of EB virus, Burkitt lymphoma cells: 2435
  - effect of herpes-type (EB) virus *in vitro*: 341
  - infection, Burkitt lymphoma cell lines: 1060
    - spleen and thymus, hamster: 1247
- transformation, surface antigen, hamster cells: 2434
- Type 2 genital infection, cervix cancer: 773,2099,2905,2906,2907

VIRUS, HERPES-TYPE
- Epstein-Barr (human; Burkitt lymphoma)
  - cancer of nasopharynx: 1593,2106
  - cell lines, radiation effect on DNA, interaction with normal human WBC: 2622
  - comparison with Lucké frog kidney tumor virus: 1261
    - reovirus: 1809

VIRUS, HERPES-TYPE (contd.)
  - detection and properties, human leukemia and lymphoma: 100,101,337,338,339,340,343,550,551,772,777,1055,1057,1058,1060,1259,1260,1505,1506,1912,1914,2100,2386,2911
  - effect of reovirus type 3 *in vitro*: 1503
  - growth stimulation, human WBC culture: 342
  - infection, incidence, Brazil: 2146
  - kittens: 550
  - infectious mononucleosis: 339,340,1505,1590,1912,2387,2634,2910
    - induction, human cancer: 1591
  - interaction with herpes simplex virus *in vitro*: 341,2102,2435
    - mumps virus, cell lines: 2101
  - karyotype of virus-containing cells: 344,1260
  - possible interaction with malaria, review: 1156
  - serum antibodies
    - human cancer: 2103,2104,2105
    - Kaposi's sarcoma with rejected kidney graft: 1646
    - post-perfusion syndrome: 2107
    - U.S. and Africa, review: 2753
    - women, Sweden: 2852
  - surface antigens, cell lines: 1504,1592
    - xenotransplanted tumor (rat): 2108
    - transformation, fetal WBC: 1798
- L_2C/NB guinea pig leukemia: 2436
  - leukemia-susceptible guinea pig: 2635
- Lucké (frog kidney adenocarcinoma)
  - incidence, seasonal variation, wild *Rana pipiens*, Minnesota: 590,2111
  - isolation, urine, tumor-bearing frog: 2636
  - morphology: 991,1866
    - comparison to Epstein-Barr virus: 1261
  - propagation, frog embryo cell culture: 1589
- Marek's disease (chicken)
  - associated GA virus, liver tumors, RNA methylase activity, chick: 2437
  - host immunity: 364,818,823,824,2109
  - isolation and properties: 363,1015,1016,1017,1531,1532,1913,2110,2901,2902
  - reaction with avian leukosis-sarcoma virus antigens: 2359
  - survival, litter and droppings, chickens: 819
  - transmission, chickens: 820,821,822

VIRUS, HYBRID
- human adenovirus (types 2 or 12)- simian adenovirus (SA7)
  - properties: 141,142
- LLE46 (SV40-adenovirus 7)
  - surface antigens, transformed cells: 1864
- LL strain SP-2 (SV40-adenovirus 7)
  - adenovirus replication, transformed cells: 2839
  - hamster tumor and transformed cells, properties: 2840
- SP-2 (SV40-adenovirus 7)
  - transformation, dog kidney cells: 2641
- SV40-adenoviruses
  - defective, review: 1655

- IRUS, HYBRID (contd)
    - SV40-adenovirus 7
        - hamster tumor, properties: 2840
        - transformation, dog kidney cells: 2641
        - transformed cells, properties: 2840
            - surface antigens: 1864,2373,2429
        - virus replication, normal or transformed cells: 347,2839
    - SV40 PARA-adenovirus 1, 2, 5, 6 or 7
        - genome complementation: 2858
    - SV40 PARA-adenovirus 12
        - transformation, SV40 antigens, hamster tumor: 1573
- RUS, LEUKEMIA/LYMPHOMA
    - AKR (mouse)
        - effect of interferon: 1250
        - group antigen: 2593
        - interference by mammary tumor virus: 2612
    - amphibian lymphoma
        - isolation, spontaneous lymphosarcoma, *Xenopus*: 2334
        - review: 908
    - avian erythroleukemia (chicken)
        - radiation effects *in vivo*: 1171
    - avian leukosis
        - comparison to mouse leukemia virus, review: 2212
        - control, Hungary: 799
        - detection, chick embryo cells: 1534
        - immunity, variations, flock of inbred chickens: 2877
        - immunization, adult or embryonic chickens: 798
        - intracytoplasmic structures, review: 1674
        - lymphoid, immunity, chicken: 364
        - male reproductive tract, chicken: 797
        - multiplication, endocrine organs, chicken: 1263
        - ocular, pathology: 1265
        - possible vaccine transmission, review: 1657
        - review: 245,246,247,248
        - serum antibodies, human leukemia: 1262
        - strain differences in response, chick embryo: 125
        - subgroup B, envelope antigenic determinants: 2609
    - avian myeloblastosis
        - effect on Rous virus resistance, mouse: 2874
        - group-specific antigen, analysis: 2820
        - hamster tumor: 2354
        - properties of RNA: 2395,2821,2860
        - protein components: 1831
        - RNA, associated nuclease: 2863
            - hybridization with Newcastle disease virus RNA, normal cells: 801,2862
        - structure and immunology, chicken and mammal: 800
        - subgroup B, transformation, chick cells: 2606
        - transformation of malignant cells *in vitro*: 1264
        - virus-cell interactions, chick: 2607
    - BAI strain A (avian myeloblastosis)
        - amino acid-acceptor RNA, isolation and properties: 2605
- VIRUS, LEUKEMIA/LYMPHOMA (contd)
        - classification: 1820
        - duckling tumors: 1540
        - group-specific antigens, hamster tumor or immunized chickens: 2359
        - hamster tumor: 2604
        - RNA analysis: 1533
        - transformation, chick cells: 2606
    - BALB/Tennant (mouse), host genetics (histocompatibility): 574
    - bovine leukosis
        - abomasum as possible invasion site: 802
        - control, Germany (Saxony): 817
            - methods: 810
        - epidemiology: 812
            - Britain: 608
            - France: 815
        - genetic susceptibility: 813,814
        - properties: 1266
        - review: 244
        - transmission: 803,804,805,806,807,808,809, 811,812
            - review: 678
    - bovine lymphosarcoma, isolation and properties: 1274
    - bovine reticulosis, pathogenicity, mouse: 1267
    - Breyere-Moloney (mouse), group antigen: 2593
    - B/T-L (mouse), properties of infected cell lines: 2336
    - Buffet (mouse), group antigen: 2593
    - C-60 (Manaker) (mouse), group antigen: 2593
    - 334C (mouse)
        - effect on Friend virus leukemia: 1600
        - transmission: 2337,2338
    - C57 (mouse), RES function during infection: 2631,2632
    - canine
        - lymphoma
            - boxers: 560
            - transmission: 559
        - lymphosarcoma, attempted transmission: 794
            - spontaneous, particles resembling mouse Type C virus particles: 2830
        - mast cell leukemia, transmission: 793
        - reticulum cell leukemia, isolation and transmission (tissue culture and mice): 792
        - review: 243
    - D-9 lymphoma (hamster)
        - isolation and properties: 1525
    - feline leukemia (lymphosarcoma)
        - comparison to avian, mouse or human leukemia viruses: 1815,1874
        - isolation and transmission: 562,563,1009
        - review: 243
        - ultrastructure: 1008,1010
    - Friend (mouse)
        - bioassay, method: 1024
        - chemotherapy: 2389
        - comparison to S63 and GC mouse lymphoma viruses: 1808
        - cross-resistance: 105
        - determination, rat-mouse heterospecific chimera: 106

VIRUS, LEUKEMIA/LYMPHOMA (contd)
    - development of lymphatic leukemia virus, infected rat: 1023
    - effect of
        - actinomycin D: 2629
        - interferon or interferon inducer: 370, 596,844,1878,2079,2399
        - polyethylene glycol precipitation: 2345
        - thiamine deprivation, mouse: 367
    - effect on
        - erythropoiesis: 781,2074
        - rat tumors: 2346
    - FV 606 strain, self-limited leukemia, host factors: 2340,2341
    - group antigen: 2593
    - growth patterns: 1031
    - host genetics: 1601,2596,2825
    - immunity: 515,369,779,780
    - immunization, tumor neoantigens: 2826
    - immunosuppression: 123,1514,1515,2599
    - infected cells
        - tumor induction: 1875
        - ultrastructure: 1814
    - interaction with
        - hematopoietic cells: 2075
        - non-tumor viruses, *in vivo*: 108,572,1881
        - other mouse leukemia or sarcoma viruses: 577,1600,1823,1881
    - low- and high-titer cell clones, properties: 1027,2827
    - nuclear size, mouse spleen: 1599
    - NTF reticulum cell sarcoma: 1811,1812
    - pathogenicity, *Praomys (Mastomys) natalensis*: 1523
    - placental and milk transmission: 1028,1029, 1030,2865
    - production, cell lines: 2343
    - properties of enzyme: 2344
    - RNA structure: 1253
    - role of cellular DNA in replication: 1513
    - separation of 3 components: 1022
    - sex difference in sensitivity: 1813
    - spleen and liver enzymes: 124,1602,2401
        - RNA: 1877
    - structure and leukemogenic activity: 122
    - susceptibility, effect of Rich viral lymphoma: 2400
    - transplantation immunity: 1026
- Friend polycythemia virus (mouse)
    - effect on erythropoiesis and spleen enzymes: 1254,2597
- Friend spleen focus-forming component (mouse)
    - genetic susceptibility: 1025
    - nature of susceptible cells: 2342
    - radiation effects *in vitro* and *in vivo*: 2598
    - separation and bioassay: 1022,1879,1880
- Graffi (mouse)
    - cell surface antigens, demonstration, method: 2627
    - comparison with other mouse leukemia viruses: 2594
    - distribution, preleukemic or leukemic stages: 785
    - host immunity: 369,845
    - interaction with Gross virus: 1512
    - morphology, bone marrow megakaryocytes, mouse: 368

VIRUS, LEUKEMIA/LYMPHOMA (contd)
- Gross (mouse)
    - antigen, effect on immunity to I_b leukemia: 2076
    - bioassay, method: 1606
    - comparison to cat leukemia virus: 1815
    - cross-resistance: 105
    - development of transplanted thymoma: 1605
    - group-specific antigen, isolation and properties: 2593,2626
    - host genotype and virus sensitivity: 1019, 1020,2735
        - immunity: 780
            - review: 1673
    - infected mouse cell line, tumor induction: 1875
    - interaction with Graffi virus: 1512
    - isolation, method: 2628
    - lymphoma cell lines: 1021
    - morphology, marrow megakaryocytes: 368
    - passage A, transmission, mouse: 1251
    - persistence of infection, tumor cell cultures: 2402
    - possible occurrence, NZB mouse strain: 2601
    - propagation in kidney: 1816
    - rat cell lines, tumor induction, rat: 1258
    - soluble tissue and plasma antigens: 1018
    - susceptibility, mammary tumor virus-infected AKR mice: 2612
    - thymic lymphoma, pathogenesis: 2403
- guinea pig
    - isolation and properties: 786,1595,2069
- hamster
    - isolation (skin tumors) and transmission (hamsters and mice): 1011
    - properties: 2879
    - Type A particles, radiation-induced lymphoma: 1710
- Herbut (mouse; from human leukemia), group antigen: 2593
- HIPA mesenteric and ascites plasmacytoma (mouse), properties: 2824
- human
    - attempted isolation: 163,548,558,775,777
    - "Australia antigen," review: 1671
    - cell lines, cloning efficiency: 1594
    - comparison to feline and mouse leukemia viruses: 1874
    - familial Chediak-Higashi anomaly: 1801
    - Hand-Schüller-Christian disease, child: 1799
    - immunology: 552
- human, isolation and properties: 157,336,343, 542,556,593,1806,2335
    - morphology: 1059,1802
    - *Mycoplasma* infection, human: 1804
    - review: 1357
    - serum hemagglutinins: 1803
    - transmission, review: 678
- Japanese quail reticulum cell sarcoma, properties: 2406
- Kaplan (mouse; radiation-induced leukemia), group antigen: 2593
- LVKL (latent chicken leukosis), from Rous virus-resistant culture, isolation and properties: 2610

IRUS, LEUKEMIA/LYMPHOMA (contd)
- MC29 (avian myelocytoma)
  - classification: 1819
  - ultrastructure, chick embryo cells: 2082
- Mazurenko (mouse)
  - host immunity: 369
  - liver catalase: 2602
- Mill Hill #2 reticuloendothelioma (chicken), duckling tumors: 1540
- monkey, isolation attempt: 1508
- Moloney (mouse)
  - attempted isolation of infectious RNA: 2829
  - cellular immunity: 2347,2867
  - comparison to other mouse leukemia and sarcoma viruses: 1808,2594
  - cross-resistance with other viruses, mouse: 105,2595
  - effect on
    - host RBC: 1038
    - interferon sensitivity in vitro: 2871
  - host immunity, mouse: 369,575,779,1822
    - rat: 1608,2348
  - immunoassay in vitro, methods: 599,851
  - immunochemotherapy: 2078
  - immunosuppression: 1515
  - infected mouse cell line, tumor induction: 1875
  - interaction with Moloney sarcoma virus: 577,795,1040
  - Moloney sarcoma virus complex
    - identification of helper virus: 1609,2081
    - RNA properties: 1521,2861
  - morphology, reproductive tract, mouse: 366
  - new sarcoma-inducing variant: 1607
  - properties of competent hybrid: 373
  - related viruses, isolation, method: 2628
  - replication and release patterns in vitro: 579,2347,2832,2867
  - YAC lymphoma, polyoma virus sensitivity: 1568
- mouse
  - activation by methylcholanthrene: 307
  - attenuation, method: 602
  - cell line, erythropoietic effects: 1598
  - classification: 107,604,606,2593
  - comparison to human and feline leukemia viruses: 1874
  - effect of immunosuppression (radiation or heterologous anti-thymocyte serum): 576,2823
  - helper activity for mouse sarcoma virus in vitro: 127,372
  - "host range" variants, strain differences: 2396
  - immunity: 597
  - isolation and properties: 558,573,598,783, 850,1706,2628
    - chemically induced leukemia and lymphoma: 787,1499,2305,2822
    - mammary tumor virus-infected mammary gland: 376
    - milk of high- or low-tumor strains: 377
    - radiation-induced leukemia or lymphoma: 787,789,1170
    - spontaneous reticulum cell tumor: 787

VIRUS, LEUKEMIA/LYMPHOMA (contd)
  - liver catalase: 601
  - radiation effects and host factors: 2229, 2822
  - reticulum cells, thymus or lymph nodes: 104
  - review: 238,240,692,693,2001
  - RNA hybridization with SV40 DNA: 2897
    - replication, mechanism: 2860
  - sarcoma induced by sheep RBC: 2491
  - thymic lymphoma, tumor-specific antigens: 2397
  - transmission, CFW$_W$ strain: 1893
    - hybrid strains: 1892
  - ultrafiltration, method: 1509
  - viral and virus-induced antigens: 2864
- mouse erythroblastosis virus
  - host response, mouse or rat: 665,847
  - long-term in vitro propagation: 126
  - RNA analysis: 1516
  - tumor pathology: 605
- mouse lymphocytic sarcoma virus
  - properties: 2070
- mouse myeloma virus
  - Type A particles: 1873
- mouse plasma cell leukemia virus
  - amyloidosis-inducing agent: 573,1672,2499
- mouse polycythemia virus
  - effect on erythropoiesis: 781
- NZB mouse, autoimmunity syndrome, review: 1129,2743
- PS (mouse), mammary tumor induction: 1834
- RadLV (radiation leukemia virus; mouse)
  - host immunity: 2072
  - lymphoma, rat or mouse: 1511,1596,1597
  - rescue of defective Moloney sarcoma virus, mouse: 1889
  - thymic lymphoma, tumor-specific antigens: 2397
- rat lymphatic leukemia virus
  - Friend virus-infected rat: 1023
- Rauscher (mouse)
  - antigen titration method: 1810
  - attenuation, methods: 848,1817
  - cell lines: 1033,1034,1035,1875,2603
    - hyaluronic acid synthesis: 1818
  - chemotherapy: 1918
  - comparison to
    - heterotransplanted human or canine leukemia, mouse: 2405
    - L cell agent: 783
    - S63 and GC mouse lymphoma viruses: 1808
  - cross-resistance with other viruses, mouse: 105
  - effect of
    - antitumor enzyme: 1604
    - interferon or interferon induction in vivo or in vitro: 1036,1037,1510, 2079,2339,2871
  - enzyme metabolism: 784
  - erythropoiesis: 781,1255
  - group antigen: 2593
  - growth patterns: 1031
  - host immunity, mouse: 369,575,600,779,780, 782,852,2339

- VIRUS, LEUKEMIA/LYMPHOMA (contd)
    - immunoassay *in vitro*: 599,851
    - immunosuppression: 123,2404,2600
    - interaction with
      - non-oncogenic viruses: 108,572,1876
      - other leukemia or sarcoma viruses: 577, 1881,2350
    - *in vitro* pathogenicity: 697,849
    - lymphoma pathology: 571
    - platelet kinetics: 1256
    - properties of ether-extracted virus: 2077
      - variant (JLS V5): 365
    - reduced-virulence strain, properties of carrier culture: 2880
    - RNA, homology with host cell DNA: 2630
      - structure: 1032,1033,1257,1603
      - serum copper: 1882
    - spleen and liver enzymes: 1602
    - splenic invasion, effect of vaccine: 2828
    - ultrastructure: 603,846
  - RAV-1 or RAV-2 (avian leukosis), surface ultrastructure, infected cells: 1537
  - reovirus #3, lymphoma, mouse: 788
  - review: 687,916,2221
  - Rich lymphoma (mouse)
    - distribution, thymus: 1252
    - group antigen: 2593
    - pathogenesis: 2073
    - susceptibility to Friend leukemia virus: 2400
  - RPL-12 avian leukosis
    - immunology, chick: 581
    - tumor pathology and effect of bursa of Fabricius, chick: 580
  - S63 and GC lymphoma (mouse), comparison to mouse leukemia viruses: 1808
  - swine, particles resembling, radiation-induced leukemia: 695
- VIRUS, MAMMARY TUMOR
  - cat mammary carcinoma: 1595
  - dog, spontaneous, enterovirus-like particles: 2830
  - human
    - breast cancer: 131,1059,1276,1805,1895
    - premalignant skin disease (Bowen's disease): 1894
  - mouse
    - attachment and penetration, mouse embryo cells: 1901
    - bioassay, method: 1896,1900
    - cell line: 1277
    - detection, milk: 130,136,377,1614,2084
      - RBC: 135,1052
    - distribution: 1544
    - effect on
      - hyperplastic mammary nodule: 1617,2363
      - radiation-induced tumors, mouse: 136
      - systemic or mammary response to pituitary hormones: 179,1548,2363
      - virus-free mammary nodules: 137
    - hormone effects, mammary tumor *in vitro* or *in vivo*: 1902,2083
    - host genetics: 118,173,180,838,839,1053,1837
    - hyperplastic mammary nodules, high- and low-cancer strains: 1616
- VIRUS, MAMMARY TUMOR (contd)
    - immunity: 134,840,1546
    - immunization: 2362
    - immunoassay, method: 1899,2361,2364
    - interference with viral leukemogenesis, AKR mouse: 2612
    - isolation and properties: 1543
    - leukemia virus-like particles, infected mammary gland: 376
    - liver extract-induced tumor regression: 2365
    - mammary gland aging *in vivo*, agent-positive or agent-free mice: 1051
    - mechanism of action, review: 464,687
    - particles resembling, mouse brain tumor (ependymoblastoma): 2416
    - pathogenesis of infection: 1052,1547,1615
    - physical properties: 1897,1898
    - plasma cell tumors, foster nursing, mouse: 132
    - production and identification *in vitro*: 119, 133
    - propagation, mixed tumors: 1835
    - properties of tumor-specific antigens: 2611
    - replication, mammary tumor cultures: 1542
    - RNA structure: 1836
    - serum antibodies, mouse, rabbit and monkey: 1278
    - specific soluble antigen: 1545
    - transmission, CFW$_W$ strain: 1893
      - hybrid strains: 1892
      - milk: 130,1614
    - tumor development during lactation: 2084
    - Type A particles, morphology, review: 1365
    - Type B particles, staining method: 378
    - viral and virus-associated antigens: 2864
  - PS (mouse), from PS leukemia: 1834
  - rat, Type C particles, radiation-induced mammary tumor: 2085
- VIRUS, PAPOVA (papilloma-polyoma-vacuolating)
  - bovine papilloma
    - hamster skin tumors: 993
    - immunity, horses with equine sarcoid: 138
    - morphology: 120
    - tumor histology, calf: 1588,2851
  - cancervirus (human cancer cell DNA, mouse cell-adapted)
    - complementarity to cell DNA, transformed mouse cells: 2842,2843
  - classification, review: 2212
  - DNA, circularity and supercoiling: 2855
    - interaction with cellular DNA, review: 1355
  - hamster skin tumors: 2900
  - human wart
    - effect on SV40 tumors, hamster: 2845
    - hereditary epidermodysplasia verruciformis with malignant transformation: 2965
    - ultrastructure: 992,2651
  - mechanism of action, review (book): 916
  - particles resembling, human choriocarcinoma: 2976
    - Wilms' tumor: 1906
  - polyoma
    - activation, immunosuppression, mouse: 2094
    - transformed cells: 2619,2883

IRUS, PAPOVA (contd)
    - and acetylaminofluorene, liver, kidney and s.c. tumors, rat: 2309
    - antilymphocyte serum-induced resistance, mouse: 2428
    - cell-dependent mutants, isolation: 2887
    - cellular DNA and histone synthesis, mouse embryo cells: 2649
    - chromosome abnormalities, transformed cell line: 2492
    - DNA
        - binding to cellular RNA: 2379
        - infectivity, mouse cells: 994
        - interaction with transformed cell DNA, review: 2214
        - properties: 1849,1853,1916
        - replication: 2650
    - effect of antitumor agents, normal cells: 828,1618
    - gene activity, infected or transformed cells: 2380
    - hamster tumors, viral and tumor mitochondrial DNA: 1848
    - high titer, method of preparation: 1851
    - host and tumor immunity, hamster: 829,2848
    - immunization, mouse: 2095
    - interferon induction, normal cells: 1572
    - infection, hamster cell clone: 1120
        - spleen, mouse: 2427
    - isolation, transformed or tumor cells: 1855
    - kidney sarcoma, rat: 2382
    - latent infection, L cells: 589
    - mechanism of action, transformed cells: 1105
    - morphology of particles: 1847,2651
    - propagation, mouse salivary gland explants: 1854
    - purine requirements, transformed cells: 2093
    - radiation effects, hamster: 995
    - and Rous virus, double transformation, hamster cells: 2390
    - salivary gland tumor pathology, animal: 103,1281
    - s.c. and brain tumors, rabbit: 2381
    - sensitivity, spontaneous or induced mouse tumors: 1568
    - serum antibodies, hamster: 1571
    - temperature-sensitive mutants, classification: 2846,2847,2886
    - thymidine kinase, deficiency, cell line: 2376
        - effect of antimetabolites, normal cells: 1567,2889
    - transformation
        - amino acid transport: 2849
        - cell surface properties: 1569,1574,1864, 2373,2426,2434
        - effect of dimethyl sulfoxide, hamster cells: 2850
        - host cell RNA, hamster cells: 2371
        - rat and hamster cells: 2618
        - reversion, hamster cells: 2377
        - viral DNA titers: 114
    - transformed cells
        - attempted induction of infectous virus production: 2615
        - extract, effect on normal cells: 359

VIRUS, PAPOVA (contd)
        - growth in mixed culture: 1852
        - glycosidase activity: 2617
    - tumors
        - histology, mouse: 1570
        - immunity, rabbit: 2620
    - stimulation by adjuvant, mouse: 1827,2621
    - viral and cellular DNA synthesis: 1850
- Shope papilloma (rabbit)
    - antigen production, normal cells: 587,827
    - carcinomas Vx2 and Vx7, relative malignancy: 358
    - host immunity: 2097
    - induction, low temperature, rabbit cell line: 2096
    - skin carcinoma, virus propagation: 1587
    - spontaneous regression of rat tumors: 2425
    - transformation, host resistance, rat and hamster: 2098
    - tumor chromosomes: 356,357
    - ultrastructure: 997
- SV40
    - brain and s.c. tumors, rabbit: 2899
    - cross-immunity to dimethylbenzanthracene sarcoma, hamster: 2288
    - defective or monkey cell-adapted, replication, human embryo cells: 139
    - DNA
        - effect of antitumor agents: 1861,2092, 2375,2647,2885
        - hybridization with cellular and leukemia virus RNA: 2897
        - kinetics *in vitro*: 830,831,832,2890
    - effect on
        - cellular RNA: 1860
        - methylcholanthrene-transformed hamster cells: 115
        - poliovirus resistance, normal cells: 346
        - sensitivity to non-tumor virus, rat embryo cells: 2616
    - genetic susceptibility, human fibroblast lines: 1840
    - hamster tumors: 685,835,836,1562,1577, 1848,1859,2383,2433,2898
    - immunization by adenoviruses, hamster: 2845
    - induction, methods: 2392,2882,2908
    - infected cells, enzyme metabolism: 570
    - specific antigens: 1858
    - infection, pathology, monkey: 2090
        - serum antibodies, monkey: 569
    - interference, mechanism: 2643
    - isolation, transformed or tumor cells: 1855
    - multiplication, species difference, mammalian cells: 2642
        - virus genome, transformed hamster cells: 2644
    - mutants
        - immunochemical assay: 2374
    - monkey kidney cells: 1909
        - transformation, mouse or human cells: 1907
    - radiation response, hamster cells: 1582
    - reactivation of genome, comparison to polyoma or adenovirus, transformed cells: 2615

- VIRUS, PAPOVA (contd.)
  - reaction with adenoviruses, monkey cells: 2420,2424
  - relationship to cancervirus (papovavirus) and cell DNA, transformed hamster cells: 2842,2843
  - replication and antigen synthesis, arginine-deficient medium: 2888
  - rescue, methods, transformed cells: 833, 837,1907
  - resistance, SV40-transformed monkey and human cells: 1908
  - serum antibodies
    - human cancer, India: 1279
    - monkey: 569,1856
    - polio-vaccinated populations (including children with leukemia): 1054,1857
  - specific repressor, transformed cells: 1863
  - transcription, transformed cells: 1862
  - transformation
    - drug and radiation effects: 255,345, 1580
    - fibroblasts from normal or cancer-prone persons: 1581,2213
    - human cells: 1583,1911,1922,2431, 2432,2895
    - mammalian cells: 113,114,834,1280, 1578,1579,1584,1844,2371,2641,2891
    - mechanism, review: 686,1128,2214
    - membrane and surface properties of transformed cells: 997,998,1283, 1574,1864,2089,2373,2426,2430
    - "reversion," hamster cell line: 996
    - thyrocalcitonin and prostaglandin synthesis, human thyroid cancer culture: 2378
  - transformed cells
    - antigen composition and virus-specific RNA: 2372
      - glycosidase activity: 2617
      - human (W18VA2), chromosomes: 2646
      - monkey or human, absence of repressor: 2645
      - mouse-human hybrid, T antigen: 2648
    - transplantation immunity, hamster: 1282,2091,2844
      - monkey or hamster cell lines: 1619, 1910
    - tumor cell lines, virus production *in vitro* and in hamster: 1576
    - viral and tumor mitochondrial DNA, hamster: 1848
  - SV40-adenovirus hybrids (See under Virus, hybrid)
- VIRUS, POX
  - deer fibroma, morphology: 120
  - Shope fibroma (rabbit)
    - assay, inclusion bodies, normal or tumor cells: 116
    - DNA-mobilizing enzymes, properties: 588,841
    - effect of
      - arboviruses, rabbit: 2623
      - phospholipase and actinomycin, normal cells: 117
- VIRUS, POX (contd.)
    - RNA synthesis, normal cells: 1586
    - thymidine kinase, infected human cells: 1865
    - viral and cellular DNA: 1585
  - Yaba histiocytoma (monkey)
    - immunity: 1507
    - lung and other tumors, monkey: 1063,1064
    - serial passage and quantitation, monkey kidney cells: 2919
    - transmission, insect vectors, monkey colony (New York): 2384
- VIRUS, SARCOMA
  - avian
    - comparison to mouse sarcoma viruses, review: 2212
    - intracytoplasmic structures, review: 1674
    - leukosis/sarcoma, antigenic structure, review: 247
    - mechanism of action: 585
    - mechanism of action, review: 2211
    - strain 13, properties and classification: 582
    - viral and virus-associated antigens: 2864
  - B77 (chicken)
    - tumor induction, duckling: 1540
      - quail: 1541
  - cat fibrosarcoma, transmission and morphology, kitten or puppy: 2071
  - chicken, tumor development, hormone-treated monkey: 1871
  - Claude's chicken tumor-10, tumor pathology: 2360
  - FBJ osteosarcoma (mouse)
    - classification: 1886
    - effect on radionuclide carcinogenesis: 931
  - Finkel osteosarcoma (mouse)
    - transformation, rat embryo cells: 2409
  - Friend (mouse)
    - effect of interferon induction: 2410
  - Fujinami (avian)
    - chicken strain, duckling tumors: 1540
    - duck strain, transformation, duck embryo cells: 1042
    - transformed cells, growth patterns *in vitro*: 1833
  - hamster, attempted isolation, reticulum cell sarcoma: 2408
  - Harvey (mouse)
    - antigenic specificity, tumor cells: 2866
    - cross-immunity to Moloney leukemia virus, mouse: 2595
    - dual action, intact or thymectomized mouse: 1524
    - host immunity: 1041
    - immunization: 2352
    - mechanism of action: 2407
    - pathogenicity, *Praomys* (*Mastomys*) *natalensis*: 1523
    - specific tumor antigen, mouse tumors: 2595
    - transformation, biochemical changes, rat embryo cells: 1042
    - tumor pathology: 1826,1887,1888

- RUS, SARCOMA (contd.)
  - human
    - antibody formation, osteosarcoma: 1061
    - child, rhabdomyosarcoma: 548,1062
      - transmission to hamster: 1011
    - isolation, ovarian tumor: 1613
      - and properties: 558,770,776
    - myxovirus type, isolation: 592
    - osteosarcoma, tumor induction, hamster: 770,2391
    - serum antibodies: 2393
  - Kirsten (mouse)
    - tumor-specific transplantation antigens: 1885
  - Moloney (mouse)
    - antigenic specificity, tumor cells: 2866
    - biological and physical properties: 1824,1890,1891
    - cyclophosphamide therapy: 1611
    - DNA dependence, cell line: 1610
    - defective, properties: 1655,1889,1891,2868
      - rescue, radiation leukemia virus: 1889
    - distribution, mouse: 2411
    - dose-response relationships: 1275
    - effect of
      - cortisone, mouse: 109
      - cytosine arabinoside *in vitro*: 2080
      - rabbit antisera: 2350
    - helper virus, isolation and properties: 1609
    - host immunity: 1039,1822
    - interaction with leukemia virus: 577,795, 1040,2350
    - interferon effects *in vitro*: 1825,2079, 2351,2410,2871
    - *in vitro* bioassay: 374
    - mechanism of action: 2407
    - Moloney leukemia virus complex
      - antiserum effects: 1522
      - identification of helper virus, cell line: 2081
      - RNA properties: 1521,2861
  - propagation
    - bovine embryo cells: 1519,2870
      - human cell line: 1612
        - embryo cells: 2832,2869
      - mouse or chick embryo cells: 2869
      - rat or hamster cells: 796
    - properties of competent hybrid: 373
    - rescue, radiation leukemia virus: 1889
    - rat or mouse virus, tumor induction in hamster: 2349
    - rat tumor, new viral serotype: 1520
    - rhabdomyosarcoma, ultrastructure: 1062
    - serum copper: 1882
    - third component, biological activity: 1040
    - transformation, mechanism, cell culture: 1823
    - tumor induction, effect of Guaroa arbovirus, mouse: 1883,1884
      - pathology, mouse, rat or hamster: 375,578,1887,1888,2869
    - ultrafiltration, method: 1509
  - mouse
    - comparison to avian sarcoma viruses, review: 2212

- VIRUS, SARCOMA (contd.)
    - effect of cation, mouse embryo cells: 1821
    - helper activity of mouse leukemia virus *in vitro*: 127,372
    - host immunity: 128
    - isolation and properties: 558
    - leukemia pseudotypes, properties of transformed cells: 2831
    - mechanism of action, review: 687
    - transformation, conditions, rat embryo cells: 1517
    - tumor pathology: 129
  - RBI (rat; from Rous sarcoma)
    - tumor induction, chicken: 1043
  - Rous (chicken)
    - acid mucopolysaccharide production, transformed mammalian or chicken cells: 2358
    - activation, method, hamster tumor: 2875
    - analysis of proteins: 2834
    - antibodies, human leukemia: 1262
    - brain tumors, monkey: 1530
      - mouse: 1529
      - puppy: 1869
    - chick embryo cultures: 1536
    - comparison to cat leukemia virus: 1815
      - quail tumor virus: 583
    - defective, properties, review: 1655
    - detection of avian leukosis virus, chick embryo cells: 1534
    - DNA
      - bound amino acids in tumor: 2184
      - induction, normal cells: 825
    - effect of shark serum: 1050
    - effect on
      - DNA, transformed chick embryo cells: 1048
      - glycolysis, transformed chick embryo cells: 1048
    - envelope antigenic determinants: 2609
    - group-specific antigens, immunized chickens or hamster tumors: 2359
    - growth patterns, chick embryo cells: 379
    - hamster tumor, mitochondria-associated viral particles: 2355
    - host immunity: 380,800,1045,1050
      - pigeon: 2608
    - human glioma cultures: 1807
    - hybridization with avian or mammalian DNA: 2835
    - incomplete, mouse embryo cells, tumor induction in adult mouse: 2876
    - induction, cell fusion method: 2908
    - infected cells, selective aggregate formation: 1079
    - interference phenomenon *in vitro*: 1828
    - interferon induction, chick embryo cells: 1538,1539
    - maturation time, normal cells: 1830
    - mechanism of action, chick embryo cells: 1829
    - mouse tumors: 1044,1527,1528
    - mutagenesis (chromosome breaks), human WBC: 1841
    - particles resembling, quail embryo cells:2881

VIRUS, SARCOMA (contd.)

- pathogenesis of vascular tumors, chick embryo: 1046
- pathology, brain, chick: 584
  - species differences: 843
- and polyoma virus, double transformation, hamster cells: 2390
- propagation method: 1832
  - rat or hamster cells: 796
- protein components: 1831
- purine requirements, transformed cells: 2093
- rat variant (RBI), tumor induction, chicken: 1043
- rescue, Sendai virus, cell fusion method: 1535,2872
- resistance, effect of avian myeloblastosis virus, mouse: 2874
  - genetics, chick embryo cells: 1047
  - isolation of latent chicken leukosis virus (LVKL): 2610
- RNA
  - physical properties: 826
  - replication mechanism: 2860
  - structure: 1032,1257
- sarcoma with leukemoid reaction, germfree rat: 2412
- strain differences: 586
- RSV-RAV1, natural immunity, chicks: 1870
- RSV-RAV50, surface antigens, transformed cells: 1864
- surface ultrastructure of infected cells: 1537
- transformation
  - cell surface properties: 1574
  - chick embryo cells: 1042
  - guinea pig or hamster cells: 381
  - mechanism, cell culture: 1823
  - role of DNA, chick embryo cells: 1518
  - marmoset kidney cells: 2414
  - rat embryo cell line: 2356
  - virus-specific antigens, hamster cells: 2415
- transformed cells, growth patterns: 1833,1852
- tumors
  - induction, baboon: 2878
    - duckling: 1540
    - marmoset: 1920
    - guinea pig or hamster: 381
    - resistance, Japanese quail: 2633
    - quail: 1541
    - stimulation by adjuvant, rat: 1827,2621
    - ultrastructure, rat: 1526
  - unmasking, monkey tumor: 2413
  - viral RNA and host cell DNA: 2357
  - virogenic or non-virogenic rat tumors: 2873
- Yoshida ascites sarcoma (rat), transmission, cell-free preparations: 2833

VITAMIN A AND DERIVATIVES

- effect on chemical carcinogenesis, hamster (cheek pouch) or rabbit (skin): 34,269, 299,1450,2285

VITAMIN C (ascorbic acid)

- effect on urinary tryptophan metabolites, bladder cancer, smoking: 2549

VITAMIN E (α-tocopherol)

- effect on chemical carcinogenesis, mouse: 730,1447,1778

WATER

- analysis, chemical mutagens, mouse bioassay: 53
  - ^{226}Ra, U.S. (Midwest, Southwest, New England, Alaska, Hawaii): 22
- benzpyrene, reaction with chlorine peroxide: 326
- chlorine content, toxicity, rat: 528
- fresh-water algae, carcinogen biosynthesis: 323
- marine phytoplankton, benzpyrene synthesis *in vitro*: 1715,2333
- trace elements, cancer incidence: 2118

WATER POLLUTION

- "Balkan nephritis" syndrome, urothelial tumors, Yugoslavia: 1951
- benzanthracene, analysis, method: 1398
- lung and g.i. cancer, U.S., review: 2734
- oil, esophagus cancer, Curacao: 1223

WOOD AND WOOD PRODUCTS

- pine pollen, occupational exposure, Hodgkin's disease, geographical variation, U.S.: 2772

XANTHINE, 3-HYDROXY-

- fibrosarcoma, DNA-bound amino acids, rat: 2184

XANTHURENIC ACID DERIVATIVES (tryptophan metabolites)

- bladder tumors, mouse: 2550

XANTHURENIC ACID 8-METHYL ETHER (tryptophan metabolite)

- bladder and lymphoreticular tumors, mouse: 2036
- metabolism, mouse: 1766,2036
  - rabbit: 2327

Zamia debilis LEAVES

- liver and kidney tumors, rat: 282

ZINC

- analysis, human tumors: 2970
- binding, mechanism, prostate cancer or hyperplasia: 1647
- soil, nasopharynx cancer, Kenya: 2927

ZIRCONIUM

- trace levels, spontaneous tumor incidence, animal: 2291

ZOXAZOLAMINE

- paralysis, effect of carcinogens, rat: 42

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MARYLAND 20014

OFFICIAL BUSINESS

If you do not desire to continue receiving this publication, please CHECK HERE ☐; tear off this label and return it to the above address. Your name will then be promptly removed from the appropriate mailing list.

LIBRARY U. OF I. URBANA-CHAMPAIGN

UNIVERSITY OF ILLINOIS-URBANA
3 0112 084231734